THE BOOK OF KNOWLEDGE

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THE AGE OF INNOCENCE

This famous picture was painted by Sir Joshua Reynolds about 150 years ago, and now hangs in the National Gallery in London. The children's faces at the bottom are from a famous sculpture of singers in the Cathedral at Florence.

The Book of Knowledge

The Children's Encyclopædia

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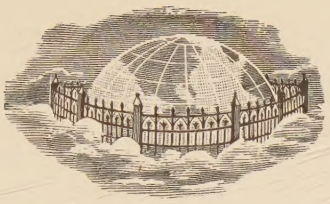

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A WALK IN AN ENGLISH LANE

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EVERY little girl and every little boy who does not want to grow up a stupid should learn by heart, and repeat over to themselves two or three times before walking out, the words of Shakespeare in "As You Like It":

> In his brain
> . . he hath strange places cramm'd
> with *observation.*

For the mind is like a cupboard, with plenty of shelves for storing interesting things, and *this* is the best "cupboard love" in the world for a child. A child should love to cram the shelves of its mind with the things of observation. It is the best of all hobbies the desire to collect things. Such a collection not only keeps us amused, but it helps us to amuse other people; it makes us interesting, and it lasts to the very end of our days.

Some men go right round the world, and when they return, and their friends say, rather foolishly, "Tell us all about it," they reply: "Why, there isn't much to tell except that it was very hot in India and terribly rough on the Atlantic!" Another person, coming back to luncheon after a walk across familiar green fields at home, will make the time fly away with a most delightful narrative of all the simple things he has seen, reflected upon, and remembered. It is a great thing to cram the mind with observation; and every thoughtful little girl and every little boy who really and truly wishes to become well informed should remember that the eyes and the ears are the organs of the soul, given to them for cramming the brain with interesting things. Now, there is a green lane close to my house which, although it has the grand name of Queen Eleanor's Walk, is quite an ordinary little green lane, and many a ploughboy trudges through it on his way back from work without any thought in his head except that it is a short cut.

But there are three little girls in my house—we don't keep boys—who love Queen Eleanor's Walk, and who go there nearly every day, winter and summer, and always come back with something fresh to tell about it. If you were to say to them that it is just like any other green lane, they would call out in a chorus of indignation: "Oh, no, it isn't; it's quite different; it's the prettiest green lane in the world!" But you would not be so very wrong after all. It *is* very like any other green lane. For every green lane, every green field, every sand-pit, every chalk-pit, every rod, pole, or perch of marsh or moor, and every handful of the earth's dust, is full of the same mystery—the mystery of Nature, the mystery of existence, the mystery of God. We have only got to look close enough to find there is interest *everywhere.*

But I must tell you about Queen Eleanor's Walk. It is a green lane, but there are tracks on either side made by waggon-wheels, and the middle is rather rough walking because of the deep cuts made in wet weather by horses' feet. Once, when we first came upon this lane, I asked the three little girls how they knew carts passed that way, and, very surprised at my asking such a foolish question, they pointed to the ruts and the marks of the horses' feet. But I said: "Suppose that there were no marks on the grass, how could you tell then?"

There was a pause, and the three little pairs of eyes looked here, there, but not everywhere; and were just about to give it up, when one of the three little tongues cried out: "I know!" and a tiny finger pointed to the branches overhead. These branches had caught and kept from the passing waggons stalks of yellow wheat.

The branches in Queen Eleanor's Walk are a great joy to us for many reasons. They grow very thickly on either side, and curve at the top till they form a roof, which makes the walk cool and deepens the greenness of the grass.

THE QUAINT AND INTERESTING THINGS THAT ARE FOUND IN THE TREES

Then you will find the queerest coloured little flies, with spots on their backs, occupying a twig; and in the fork of a bough a mossy bird's-nest hidden by bunched leaves; and lying along a branch, so exactly like it that even birds in the trees do not observe it, a caterpillar; and you will often see an ant tearing along a branch with all the speed and fuss of an old gentleman running to catch his train; and perhaps a baby spider—there are many wonderful and even beautiful spiders in the lane—going on a voyage of exploration.

Now, our three little girls are too young to know all about the real names of these things, and not quite patient enough just yet to learn every curious thing there is to learn about their habits. But they love watching these things, and I will tell you how they think about them. They think of them as people with homes of their own, who have fathers and mothers, and brothers and sisters, and must work for their living or die of starvation. They say of a tiny spider: "I expect he's a boy, and he's going to see if he can't surprise his mother by bringing her home something nice to eat." And of the caterpillar: "I dare say he's thinking where he will go for the holidays when he wakes up a butterfly." And of the little green and speckly grey flies: "I expect they're rather frightened when the night comes if their mothers and fathers have been eaten by the birds."

THE BEAUTIFUL WILD FLOWERS THAT GROW IN THE GREEN LANE

Our three little girls talk in somewhat the same way of the beautiful wild flowers which grow in the thick grass of the banks on either side of this dim green lane. But they know most of their names, particularly the pink and white campions, cow's parsley, buttercups, celandines, stitchwort, blue bells, and scabious.

They talk of the mystery of these things. How is it that one flower is blue and another is yellow, seeing that they grow in the same soil, and feed on the same sun and the same air? What is colour? What is scent? Why does one flower give scent, and not another? They are very quick to point out the smallest difference in the shape of the petals and even the shape of the stalks. "I wonder if they mind being picked, and carried home to live in a vase full of water?" they say. Sometimes they dig out a whole root, and take it back to plant in their garden; and when a friend calls and sees the flower, they say: "We took the dear little thing out of Queen Eleanor's Walk, and it's quite happy here, because we water it morning and evening, and it's got more room to grow, and it's ever so much bigger and stronger now."

But I have saved the chief joy of Queen Eleanor's Walk to the last. There is a little wood on one side, and a board says: "Trespassers will be Prosecuted," because it is full of pheasants and other creatures.

THE FLUTTERING OF THE LITTLE BIRDS IN AND OUT OF THE HEDGE

But the pheasants very often lie in the hedges, and our three little girls, who have trained their eyes to see almost everything, will soon pick out the gorgeous plumage of these crouching birds, and stand quite still, and quite close, watching them. They

always speak in whispers at these times. Then from this wood—which really does look as if the fairies dance there at night—comes the call of a cuckoo, and our three little girls know all the changes in his voice. And sometimes a baby ringdove flutters out, has a peep at us, and pops back.

Or the prettiest brown mouse in the world will scuttle under the gate, and, seeing us, will dart into the long grass of the banks, and lie quite still; we draw near on tiptoe and get a good view of his beady, black eye and his trailing tail. Or perhaps a long-legged hare, with his black and white tail, shows his red fur to us, and gallops along ahead of us, hoping that there are no dogs at the bend of the lane. Then in the hedges we sometimes find a newt, blinking his bright eyes and catching all the sunlight he can on his beautiful scales. "Mr. Newt" is a great fellow, and our three little girls only laugh at him when he is out of sight. "I wonder if Mr. Newt goes to a church or a chapel?" one will say. "Oh, I expect he's got a cathedral of his own," answers another. "Anyhow," says the third, "he can't put anything into the plate, because he has no pockets." Then perhaps they'll play at being newts, and imagine themselves living under stones; and, of course, every stone they see has a history, and probably knows something or other about the world, and the newt family which keeps house under it.

Last joy of all, Queen Eleanor's Walk is a great place for frogs and toads. These creatures are like clowns in the pantomime. They always make our three little girls laugh. Whether it is the strange hopping walk, the solemn eyes, the serious mouth, or the funny soft body which appears to be breathing in five or six places separately and all at once, I do not know; but we always laugh at them. The other day we discovered a really enormous toad, who, directly he saw that we observed him, blew himself out so very big that we thought he would burst. He was such a beauty that we made a cage of a handkerchief, and carried him home to eat slugs in the garden, and "Queen Eleanor's Toad" is now one of the pets of the home.

IT IS INTERESTING TO WATCH THE SHEEP PASS ALONG THE LANE FROM FIELD TO FIELD

I am quite sure that very few insects, very few birds, very few animals, and very few flowers live in Queen Eleanor's Walk which have not been observed, admired, loved, and talked about by these three little girls with sharp eyes and loving hearts. And it is quite an interesting conversation when we sometimes try to imagine what all these things in the lane have to say among themselves about the three little girls who so often come to see them.

THE NEXT FAMILIAR THINGS ARE ON PAGE 3991

THE SIMPLE BEAUTY OF A QUIET LANE

The poet tells us that "God made the country and man made the town," and though we may see the roadman actually at work in a quiet country lane, the beauty and calm make us feel the truth of the poet's sentiment.

The British country lanes have a beauty all their own. Flanked everywhere by magnificent trees, nodding beeches, rugged elms, massive oaks, and tall, waving poplars, they present a scene like a picture from paradise.

A PARADISE OF LIFE AND COLOUR

The little ponds in British lanes may not have the unceasing motion of the torrent, or the dancing movement of the brook, but let a stone be dropped on to their placid surface and the water is instinct with the spirit of life.

From spring to autumn the banks and hedgerows of English lanes, "sunny spots of greenery," are one boundless blush of mingled blossoms, where, as a poet has written, "the raptured eye hurries from joy to joy."

GLIMPSES OF LIFE IN THE COUNTRY-SIDE

Everywhere in the country some picturesque sight greets us, like the farm and the pigeon-house in this picture. Formerly only the owners of manors were allowed to build dovecots or pigeon-houses on their property.

When "the ploughman homeward plods his weary way" it is usually with his horses, and the scene in this picture is a familiar one in the country lane in autumn, when the harvest is over and ploughing has begun.

The photographs on these pages are by Percy Collins, W. Reid, R. W. Copeman, and others.

SHADY NOOKS BY THE SIDE OF THE LANE

Every here and there, by the side of the lane, we find a delightful spot like this, where we may gather nuts in the autumn. There is a peculiar pleasure in reaching after the nuts that are so near and yet so far.

A ferny nook like this is a temptation to turn aside from our walk in the country lane, and to roam in the shade, wandering among the bracken that grows so picturesquely beneath the trees. It is always cool among the ferns.

Not only in the lane itself is there much to interest and delight us, but as we look over the bank or through the hedge, we see sights like this. Pigs in clover are always happy, although they cannot be described as pretty.

Perhaps we may see a horse with its foal. And, surely, of all the pretty sights to be seen over the hedge, none is [illegible] this! The foal seems so very funny with its long legs out of all proportion to its body

FAMILIAR SIGHTS IN A COUNTRY WALK

Soldier and sailor beetles are familiar objects as they scramble over the flowers of plants like the wild carrot. The soldiers are reddish yellow, and the sailors black.

The peacock butterfly is one of the glories of the country, but if a shadow crosses it as it basks in the sun, it shuts its wings and looks like decayed wood.

Robin Redbreast may often be seen popping in and out of some old tin where his nest is built. This little robin is the bird after which the American robin was named.

There would be something missing in a walk through a country lane if we saw no ducks or geese, for a flock of geese, as shown here, lends a charm to the scene.

When evening is coming on we may perhaps catch a glimpse of the little hedgehog with his prickly spines. It will probably be only a glimpse, for at the first sound he darts off. If, however, we can get close to him, and he thinks he cannot escape, he will roll up into a prickly ball, as shown in the right-hand picture.

The common tiger-moth, shown here, is one of the most strikingly coloured British moths. The crimson of its hind wings gives a fine flash of colour as it flies past.

The male stag-beetle, with his great horn-like jaws, is not so fierce as he looks. He flies and walks rather slowly, and is usually to be seen at evening time.

The squirrel is a most active little creature. He never seems still a moment, and we may often see him leaping from tree to tree, taking the hazel or beech nuts.

The little wryneck looks a dull drab at a distance as he hops from twig to twig, but a closer view shows that he is beautifully marked to imitate the bark of trees.

The blackbird builds her nest of twigs and grass mixed with mud in the hedge. There she lays four or five eggs, and any time from March to July we may see the familiar objects, bluish green in colour, spotted with brown.

We can tell a stoat from a weasel by his larger size and duller brown colour. The underneath part, too, is yellow instead of white. That is his summer dress as seen here, but in winter he changes into a white coat.

The deadly nightshade is to be seen in these lanes, but its black berries must be shunned, for they are rank poison. One berry has been known to kill a person.

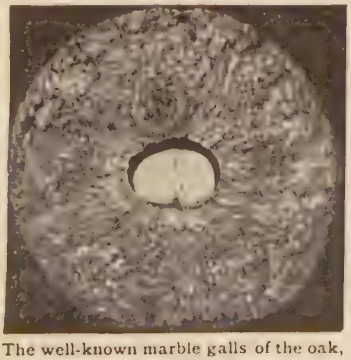
The snowberry, whose white fruits are seen here in striking contrast with the black privet berries, is not a native British shrub, but is often found on the hedges.

The cocoons of the emperor moth have spikes arranged so as to prevent enemies from entering.

There is always something of interest to be seen in the hedges of the lanes. Flowers and berries may be plucked, birds' nests are to be found, and between the branches we get a glimpse of farms and fields in the distance.

The blackberry is the most familiar of the British wild fruits; the berries provide a delightful refreshment.

The spongy, uneven oak-apple is a very familiar object of the country-side, and is worn by some people on May 29, in honour of Charles II.



The well-known marble galls of the oak, if cut open, reveal a little insect inside, called the cynips, as shown in this enlarged photograph of a section of a gall.

Here we see a cluster of the marble galls, or, as they are often called, bullet galls, which are really the work of the tiny cynips inside.

IN THE FAMILIAR HOP GARDENS OF KENT

Kent produces more than half the hops grown in England, and almost wherever one walks in the Kentish lanes he sees the hop fields on the right hand and on the left. The young hops are now usually trained upon wires.

When the hops are ripe, armies of pickers go out, and in a short time strip the fields bare. Here we see the pickers at work. Each hop is picked singly, and no leaves may be thrown into the cribs, or bins.

In this picture we see a hop garden with the fine, healthy hops ready for picking. It is not unusual for a single acre to produce a ton of hops, and the price realised varies between ten dollars and one hundred dollars.

THE NEXT PICTURES OF FAMILIAR THINGS ARE ON PAGE 3991

THE OCEAN WEALTH OF CANADA

CANADA is fifth among the countries of the world in the value of fish caught and sold. That does not give her a very high rank, but you must remember that the population of the Dominion is small, and so to Canadians the industry is much more important than it is to the people of most other countries. The value of the fish — including lobsters and oysters — caught by Canadians is about $30,000,000 a year. Nova Scotia and British Columbia have the most valuable fisheries.

DOUBLE CONTROL OVER THE FISHERIES

In Canada, the Dominion Government and the provincial governments share the control over the fisheries, and this has caused a great deal of trouble; for, until quite recently, a fisherman could not be sure to whom to go for permission to do what he wished. This difficulty has now been settled, or is being settled, but, in the meantime, a great deal of harm has been done and the fisheries have suffered very much. This is one reason, among others, why the value of the fishing catch has not increased as it should.

Most of what you have been told about fishing in Newfoundland is true about the cod and herring fisheries along the Atlantic coast of Canada, so that what I shall tell you here is in addition to what you have already read, or may read, in the article on Newfoundland.

SALMON IN BRITISH COLUMBIA

The most important of all Canadian fish is the British Columbia salmon, because the value of the salmon caught there is even greater than the value of the cod caught on the Altantic coast by Canadians. This salmon is not a true salmon at all for, unlike the salmon of eastern America and other countries, it dies shortly after spawning. In spite of this, I shall call it a salmon, as that is the name it commonly bears.

Vast schools of these fish come in from the sea and swim up the rivers to their spawning grounds, and it is at this time that they are caught in great quantities. Nobody knows much about the way in which they live or the food which they eat while they are in the ocean, as they seem to prefer the deep water, where it is not easy to study their method of life. But when the call sounds, they start for the shore in myriads and ascend the rivers, jostling one another on the way, dashing up the rapids, leaping the falls, all in mad haste to reach the spawning grounds.

THE DIFFERENT KINDS OF SALMON IN BRITISH COLUMBIA

The kind which is most used for canning is called the Sock-eye. It is rather small, for a salmon, and weighs from three to ten pounds. Its flesh is of a deep red colour, and that is the principal reason why it is preferred to its brothers. The number of these salmon is greatest every fourth year, and this difference in the "run" is seen best in the Fraser River. Why there should be three lean years, followed by a fat year, no one knows, but such is the case.

The Spring or Quinnat salmon is the largest of all, and weighs from eighteen to thirty pounds. This is the boldest and strongest of them all; but in Canada it is not used so much for canning, because the flesh of many is white and not so pleasing in colour as that of the Sock-eye. Often, however, it is quite red.

The Coho is about the same size as the Sock-eye, and is used for canning to a greater extent than was formerly the case. This is the kind of British Columbia salmon which people in the east of North America know best, for it is sent in ice to places which are as far east as Boston. Of course, it is desirable to get it to market as soon as possible, and the cars in which it is carried are sent east either as fast freight or they are attached to passenger trains.

The Dog salmon is called by that name, because the teeth of the males at

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the spawning season are shaped a little like a dog's teeth. These fish are caught in large numbers by the Japanese living in British Columbia. The fish are salted and dried, and sent to Japan and China for sale.

The last and least important of the different kinds of salmon is the Humpback, which gets its name from the odd hump on its back. It is rather a small fish and weighs from three to six pounds. The "run" is much larger every other year. It is a fish that is not considered very valuable, and the catch is quite small.

Whitefish

I imagine that most of you know something about whitefish, since they are so much liked for their delicate flavour. One of the early French explorers in Canada remarked that they were the only kind of fish of which one did not soon tire, for as a rule a continual fish diet is far from pleasing. The most of these fish in Canada are taken from the Great Lakes, although the lakes and rivers of the West are yielding a larger and larger supply every year.

As a rule, they prefer shallow water, so that they are caught along the shores of the lakes. Nor do they stray very far from the place where they are accustomed to feed. The one exception is in Lake Erie, the shallowest of all the Great Lakes, where they are found even in the centre of the lake. Our duty is to enforce more strictly the laws for their preservation, and thus give the fish a chance in the unequal fight for their preservation.

Lobsters

Lobsters are found along the Atlantic Coast of the Dominion. They are caught in traps in which bait has been placed, and the traps themselves are anchored in rather shallow water near the shore. The traps are made of slats, through which the water flows freely. The entrance is through a funnel-shaped passage, with the large end facing outward. This makes it easy for the lobster to find its way in, but very difficult for it to get out again.

The lobster itself is a very hardy creature, which will live for a long time out of water if well packed in ice. It is in this way that a good many are taken to market. Most of them, however, are canned in some of the numerous factories along the Atlantic coast. As you probably know, the lobster is green in colour when alive, but when covered with boiling water, the shell takes on the bright red colour with which you are familiar.

Decrease in lobsters

The number of lobsters is becoming smaller each year, and many are the plans which have been made to meet the situation. In all cases, there is a close season, during which they may not be caught. Sometimes the space between the slats of the traps is fixed by law, so that the small lobsters may escape, and sometimes the fishermen are not allowed to catch the little ones. It is doubtful whether it is worth while to protect the small lobster, because it is the full grown female which lays the most eggs, and the bigger she is the more eggs she lays. I am sorry to add that the fishermen and lobster canners do not obey the laws very well, and so matters are in rather a bad way.

Oysters

Canadians like to think that the best oysters in the world come from Malpeque, in Prince Edward Island. This may or may not be true, but the oysters which are found there are certainly very fine. They used to be so numerous that the farmers used them to fertilize their land. As a result of this and other things, they have become quite scarce in all the Maritime Provinces. They are found also on the Pacific coast, but the oysters there belong to a different family from those in the Maritime Provinces, and they are not nearly so large nor of such good flavour as their Atlantic cousins. Some of the Atlantic kind have been taken to British Columbia, and placed in the Pacific, but we do not know yet whether the experiment is a success.

The story of the oyster

The life history of the oyster is very interesting. The egg itself, in the course of four or five hours, turns into the larva,

SALMON BY THE HUNDRED THOUSAND

If you are inclined to doubt whether the posters on all the cars of this long train saying that they are loaded with canned salmon tell the truth, look at the picture below, and remember that it shows only a part of one cannery and that there are many others along the river, some only a few yards away. This picture was made at the railway station at New Westminster.

The Fraser River is the chief seat of the salmon canning industry in Canada and one of the leading towns is New Westminster. Here we see the salmon thrown upon the landing stage. The men and women, indistinct figures to the left, will clean them, and soon they will be encased in tin ready to start on a journey which may be to the other side of the world.

as it is called. Both of these are so small that you cannot see them without a microscope, the egg being only 1-500 of an inch across. The larva swims about for a month or so, and then attaches itself to a stone or piece of shell, or any smooth surface which it may find in the water. In this state it is called a spat, and it does not become a full-grown oyster for four or five years. The only time that it can swim is during the month that it is in the larva stage, although an oyster is able to move about a little on the bottom of the ocean.

How oysters are caught

Oysters are not caught in traps, because they do not move about, but wait for their food to come to them. The oyster fisherman gets his catch by raking the bed of the sea, and the best place to find the victims is near the mouth of a river, or in a bay where the water is partly fresh and partly salt. The fishing is done with things shaped a little like large rakes or scoops, by means of which the oysters are scooped up and placed in the fisherman's boat.

This is a very clumsy way of fishing, but it is hard to see what other method can be used. And it is not only clumsy, but very costly, for thousands and thousands of spat and little oysters are killed in the process, and many full grown oysters are either crushed to death or smothered in mud. Considering the number caught and the much greater number killed in the spat stage, the poor things have a very hard time of it, as you can imagine, and it is no wonder that their numbers have become very much less.

The eggs of fish

When you think of the enormous number of eggs that one fish will lay, you may consider it strange that the fish themselves are growing scarcer each year. The female oyster, for instance, yields about 16,000,000 eggs a year, but very few of these ever become oysters. Man is their worst enemy. Many of the eggs die almost at once, and many of the others, which become larva or spat, are eaten by fish or destroyed by fishermen in the way that I have showed you.

A lobster eight inches long will lay about 8,000 eggs. As the lobster grows larger, the number of eggs becomes greater. A lobster sixteen inches long will yield about 80,000 eggs, and larger lobsters, still more. But not more than one egg in ten or fifteen thousand ever becomes a full grown lobster, so numerous and destructive are its enemies in the sea. Of course, when the eggs are hatched in protected water and taken care of, the number of lobsters obtained from them is much greater. You will, therefore, see the necessity for hatcheries for all kinds of fish, and you will also see that we must obey the fishing laws, and make others obey them.

Fish hatcheries

One of the best methods of increasing the number of fish is to protect the eggs and young fish from their enemies. The Dominion Government has established hatcheries at different places in Canada for this purpose. Here the eggs of different kinds of fish are placed and hatched, and the little fish protected and fed until they are big enough to take care of themselves.

A hatchery is an interesting sight. One can see the eggs of various sorts of fish, the little fish just hatched, and can follow their growth, until they are ready to be placed in the lakes or streams to shift for themselves. Often the baby fish show little resemblance to the full grown specimens.

In the case of the oysters, the Dominion Government has allowed the Maritime Provinces to rent the oyster beds to people who will have the sole charge of them. This has proved a good plan in Maryland and other places, and ought to be a success in Canada, since anything which belongs to a particular person is likely to be cared for better than a thing belonging to every one, for every one's property is no one's. There is also a group of men in Canada who are interested in this and other questions about fish, and they advise the government what to do. These men are members of a section of the "Commission of Conservation," and they meet every year to talk over the different ways of protecting the fish.

There are also multitudes of freshwater fish in Canadian streams and lakes. While, of course, many are caught for sale, thousands of men spend their vacations fishing in the woods. Successful business and professional men, accustomed to every comfort in their homes, throw themselves into the primitive life of the camp with real enjoyment. This picture is called "A Good Catch" and represents a morning's work, or pleasure, whichever you choose to call it.

Photographs by Notman, Montreal.

The fisheries of Nova Scotia are the most extensive of the Dominion, and Halifax exports large quantities of dried fish. The harbour, here shown, is deep, however, and warships may often be seen lying at anchor. In winter, when the St. Lawrence is frozen, the ocean going boats, which in summer go to Quebec or Montreal, generally stop here. Halifax is well defended against possible invasion by the strong citadel. The view of the city and the harbour from it is superb.

TWO SCENES FROM THE LIFE OF BURNS

In this picture by C. M. Hardie, A.R.S.A., the poet is represented in the days of his Edinburgh fame, reading his poem of "The Winter Night" to a brilliant company at the Duchess of Gordon's Edinburgh house in 1787. The duchess is seated in the chair on the right, and many of the people present were celebrated in their day.

This picture illustrates the only meeting between Scotland's most famous poet and her most famous son-to-be. When Burns was being welcomed in the great houses of Edinburgh as the new genius of poetry, Scott was still a schoolboy. One night the boy was at the house of Professor Adam Ferguson, where the poet was a guest, and Burns, having quoted some lines of poetry, forgot for the moment who had written them. Everybody tried to recall the poem in which the lines occurred, but only the schoolboy remembered. Rather timidly he told Burns the name of the poem and its writer, as we see in this fine picture by C. M. Hardie, A.R.S.A.

A winter scene at the birthplace of Robert Burns, as it was in the poet's lifetime.

ENGLISH POETS SINCE MILTON

CONTINUED FROM 3743

JUST four years before the death of John Milton, a younger poet of less noble character, though still to be reckoned among the great writers, was appointed Poet Laureate. His name was John Dryden, who was born at the Rectory of Aldwinkle All Saints, in Northamptonshire, on August 9, 1631. Like Milton's, the parents of John Dryden were Puritans, but, unlike Milton, Dryden did not throughout his life remain faithful to the religion of his youth. Indeed, his character cannot altogether be admired, for a great part of his life was spent in supplying the theatres, that had reopened with the restoration of Charles II. to the throne, with plays of so vulgar a nature that they could not possibly be performed in public to-day.

Of course, the taste of the English people has greatly improved since the days of Charles II., when it was at its lowest, and the aim of all good people in our time is to keep public performances pure, and free from vulgarity. Instead of trying to do this, the Puritans simply shut the theatres, and perhaps did harm in that way, for as soon as the playhouses were reopened, the low-minded men and women who flattered and fawned upon the pleasure-loving king took advantage of their new liberty by encouraging the most vulgar performances. It is to the shame of John Dryden, gifted as he was with splendid poetic powers, that he did not disdain to earn his living by pleasing this low taste of his time. Thus we can never think of him with the personal admiration that we have for Milton, who could only get a few pounds for the sale of the greatest poem of those times, while Dryden was making a good living by pandering to the playgoers.

We do not know much about the early life of Dryden, except that he was educated at Westminster School, under Dr. Busby, a famous headmaster, who, although noted for his powers in thrashing his pupils, was admired and respected by all who came under his discipline. As a schoolboy, Dryden was fond of writing verses, and, also, when he studied at Trinity College, Cambridge, he continued his poetic exercises; but he does not seem to have been a scholar of any particular note. He inherited a small income, not sufficient to support him, and it was after his marriage with Lady Elizabeth

Howard, the eldest daughter of the Earl of Berkshire, that he turned to writing for the newly-opened theatres as a means of support. On the whole, his plays, though frequently containing notable passages, are unworthy, and we have only to compare the best of them with the poorest of Shakespeare's to realise how very poor they are, although Dr. Samuel Johnson, one of the least trustworthy of critics, would seem to rank Dryden before Shakespeare.

JOHN DRYDEN, THE POET LAUREATE WHO WAS A JACOBITE

When James II., brother of Charles II., came to the throne, and England seemed likely to become a Roman Catholic nation, as the new king wished to impose that church on the country, Dryden also became a Roman Catholic. This is often mentioned to his discredit; but there is little doubt that the poet was not guilty of the meanness of changing his religion to curry favour with the new king. He had been tending for some years towards the Roman Catholic faith, and, later, when William and Mary were called to rule the land after James had fled, Dryden remained a faithful Catholic, thereby losing what he had previously gained in the way of royal favour.

One of his most beautiful poems, "The Hind and the Panther," is written in praise of the Roman Church, which he likens to the "milk-white hind, immortal and unchanged," the Church of England being the panther, "fairest creature of the spotted kind," while the other Protestant Churches are likened to other animals of different kinds.

WHEN DRYDEN WAS AN OLD MAN AND POPE WAS A LITTLE BOY

Dryden's great power took the shape of satire, and some of his finest verse is that in which he gives us biting pictures of historical personages. In his later years he adapted into English verse the works of the Latin poet Virgil, and, although these translations were well received, they do not give us a very good idea of the original, which is warm with all the sunshine and glowing beauty of Nature; whereas Dryden's verse is cold and glittering, like diamond-studded jewels. On May 1, 1700, Dryden died, and was buried in Westminster Abbey.

When Dryden was an old man, the most eminent literary figure of his day, there were people always keen to see him on his daily visit to a coffee-house where many men of note were in the habit of meeting. One day, not very long before he died, the celebrated poet was pointed out to a little boy who had been brought there by a friend; and this pale-faced and delicate little fellow, when he grew up to be as famous as Dryden had been, never forgot this glimpse of his master. Already, as a boy of eleven, Alexander Pope was an intense admirer of Dryden's poetry, and had begun to write poetry himself, imitating Dryden's style. Despite his delicate health and stunted form, Pope was a marvellous student when only a child, and by the age of twelve he had written some most remarkable poems, at least one of which, "On Solitude," might be taken for the work of an elderly and thoughtful man.

He was born in London, on May 21, 1688, his father being a wealthy linen-draper, who had joined the Roman Catholic Church, like Dryden, and who, in disgust at the new reign of William and Mary, had withdrawn to a house near Windsor Forest, where the early years of his son Alexander were spent.

THE BOY OF SIXTEEN WHO RESOLVED TO BECOME A GREAT POET

The boy received some instruction from priests, but had no regular education, though his great thirst for learning, and the wonderful activity of his young mind, did much more for him than any ordinary course of education would have done. He was extremely well read in the classic authors, and throughout his poetry we find him constantly making use of the ancient stories of the gods and heroes of Greece. He was only sixteen when he determined to be a poet, and by twenty-three he had finished and published his famous "Essay on Criticism," a comparatively short poem, full of the most remarkable literary knowledge and ripe judgment. It contains many lines which are constantly being quoted, such as "To err is human, to forgive divine," and "A little knowledge is a dangerous thing." This poem left no doubt that its young author was a man of genius.

Although, on the whole, Alexander Pope was not what we should call a lovable character, he was probably a better friend, and kindlier, than his

poems would suggest, for, like Dryden, much of what he wrote was inspired by the unfriendly spirit of satire. He was the very opposite of a natural writer, every line being of clearly artificial style, even when full of force and vigorous movement. Thus, he was peculiarly unfitted to translate the great Greek poems of the "Iliad" and the "Odyssey," of which we read on pages 67 and 68, which are full of the grand and solemn music of Nature; yet his translations of these books were so popular that he was paid $40,000 for the work. Less than sixty years before Milton had received two payments of $25 for "Paradise Lost." If we were to reverse the two sums we should be placing the proper values on the relative merits of the works; but, as we have said before, the best work is not always the most highly rewarded — not that Pope was overpaid for his work, but that Milton was inadequately rewarded for his.

With the money which he thus earned, Pope bought a beautiful villa on the bank of the River Thames at Twickenham. There, as the friend of most of the great men of his time, the rest of his life was passed, and other famous poems were written, chief of these being "The Dunciad," in which he satirises all the lesser literary men who did not happen to be his friends. "The Essay on Man" was another of the notable works written at Twickenham.

If it is by no means a pleasant picture of the poet which we gather from his writings and the stories told about him, we have to bear in mind that all his life was spent in physical suffering. "When the poor little man got up in the morning," says one writer, "he had to be sewed into stiff canvas stays, without which he could not stand erect; his thin body was wrapped in fur and prunelle; and his meagre legs required three pairs of stockings to give them a respectable look." On May 30, 1744, this strange little poet died, and was buried at Twickenham, where Pope's Villa is still one of the best-known houses.

The next of the great poets is one whose poetry is particularly familiar to all young readers, and many examples of it are to be found in the CHILD'S BOOK OF POETRY. William Cowper was born at Great Berkhamstead, in Hertfordshire, on November 15, 1731, and was thus a boy of about the same age at the death of Pope as Pope had been at the death of Dryden. But there was no likeness between the two poets either in their characters or in their writings. Pope was almost entirely lacking in the gentle qualities of human affection, so far as his poetry is concerned, while this was the enduring note of everything that Cowper wrote. With Cowper the common domestic affections are for the first time in English made the almost continual theme of a great poet. He was of a gentle and quiet nature, loving all simple things, fond of animals, and full of reverence for the works of God, though equally capable of enjoying the untainted humour of simple life, as we read in his amusing ballad of "John Gilpin" on page 2641. For these reasons, perhaps, he lacks the splendid vigour of Milton, and also the powerful satire of Pope, but he reaches the hearts of common people by his gentleness and pure humanity. His greatest work is called "The Task," because he undertook to write it at the suggestion of a lady friend, as a task set him, and it is a beautifully natural description of

THE KIND-HEARTED POET AND HIS PET

William Cowper, the poet, was of a gentle and retiring nature, and was a great lover of animals. One of his pets was a tame hare, that lived for thirteen years, and at its death the poet wrote the "Epitaph," given on page 2127.

everyday life and the changing seasons. Cowper's father was a clergyman, and, his mother dying when he was about six years old, he was sent to a boarding-school, where he led a very miserable life for two years before he became a scholar at Westminster School. At eighteen he entered a law-office, and when twenty-three he had qualified as a barrister, but did little or no legal work, living a quiet and pleasant life in the Temple, and writing a little for the publications of the day. Some twenty years later, a relative secured for him an important position in the House of Lords, but the poet was so shy of appearing in public, as this office required him to do, that another post was suggested for him, and for this he had to pass an examination, in preparing for which he overtaxed his mind, and had, for a time, to be confined in an asylum.

THE SHADOW ON THE LIFE OF WILLIAM COWPER, THE GENTLE POET

A tendency to melancholy was the result of this mental disturbance, and for the rest of his life, though enjoying long periods of happiness, he lived under the shadow of the dread return of his malady, but he was fortunate in the tender love of friends, won to him by his gentle nature.

Apart from his many and beautiful poems, Cowper was one of our most charming letter-writers, and from one of his letters we take a description of himself. "As for me," he writes, "I am a very smart youth of my years. I am not, indeed, grown grey so much as I am grown bald. No matter. There was more hair in the world than ever had the honour to belong to me. Accordingly, having just found enough to curl a little at my ears, and to intermingle with a little of my own that still hangs behind, I appear, if you see me in an afternoon, to have a very decent head-dress, not easily distinguished from my natural growth, which, being worn with a small bag and a black ribbon about my neck, continues to me the charms of my youth, even to the verge of age." At East Dereham, Norfolk, April 25, 1800, this sweet singer, but afflicted man, passed to his rest.

The next great poet in the order of birth had died four years before Cowper, although he had been born twenty-eight years later. The name of Robert Burns has a more universal fame than that of his elder contemporary, whom, as a man, he resembled in no way, but whom he outshone as a poet, by reason of a wider range of feeling and a still greater sweetness of song.

THE SCOTTISH FARMER'S SON WHO BECAME A WORLD-FAMOUS POET

The story of Burns is, in some ways, sadder than that of Cowper. He was a great poet, who left us a splendid legacy of poetic beauty, but he might have given us so much more, had he not, largely through his own folly, died too soon, with many a gem of song unsung.

Burns was born at Alloway, near the town of Ayr, on January 25, 1759; and, being the son of an intelligent farmer, who justly valued education, he received a good and serviceable training as a boy. This should be remembered, for he is too often described as a "peasant poet," assuming him to have sprung from a race of farm labourers. Although, in his youth, he did engage in farm work, we must not confuse him and his people with the uneducated rural clods of his time. He had, indeed, the good fortune to have for tutor one who had a real love of literature, and so cultivated the taste in his pupil that, early in life, Robert began the study of literary form; by which we mean not merely the reading of poetry because it pleases us, but the examining of the very words and phrases, to discover how the poet builds up the beautiful word-pictures which engage and please our fancy.

WHEN ROBERT BURNS WROTE HIS GREATEST SONGS AND POEMS

While still employed with the work of his father's farm, much of Burns's time was spent in studying the poets, and particularly those who wrote in the tongue of his native land, such as Allan Ramsay and Robert Fergusson. When he was twenty-five years of age his father died, and the poet himself became farmer on his own account; but, being without money, he soon got into difficulties, and being a poet, instead of a man of business, he sought to free his mind of his troubles by forgetting about them while he wrote his poems. For all the world the results were glorious, and in one marvellous year he had written poems enough to make his name immortal. "The Cottar's Saturday Night," "The Jolly Beggars," and "The Address

John Dryden

Alexander Pope

William Cowper

Robert Burns

William Wordsworth

Samuel T. Coleridge

to a Mouse" were among them; but he had not improved his condition as a farmer. At the end of two years he was still in difficulties, but still pouring out his wondrous song, with a feeling, a grace, and a perfection of music which none before him surpassed, and scarcely any had ever equalled.

In the hope of raising sufficient money to leave his native land and try his fortune in the West Indies, the poet brought out the first collection of his writings in a volume published at Kilmarnock in 1786, a copy of which is worth about $3,500. Very soon these poems were being mentioned everywhere, and, although only a few dollars had been earned by the book, the young poet saw that fame might be within his grasp; so, instead of carrying out his intention to emigrate, he decided to stay in his native land. Perhaps, for his later life, this was almost a misfortune, as he found himself, when he went to Edinburgh in the winter of that year, the lion of the hour, sought after by all the great people of the town. His book was reprinted the next year, and brought him some much-needed money; but the entire sum he made from it, over several years, was only $2,500.

His magnificent gifts of song had now burst into full flower, and it is astonishing to discover how vastly he enriched the poetry of his native land in a short space of time, by writing numerous new songs to old tunes. In 1788 Burns moved to Ellisland Farm, near Dumfries, and married Jean Armour; but the next year he was appointed to a post in the excise service, which may be considered as one of his greatest misfortunes, for it led him into company, where his fondness for dram-drinking had all too much encouragement. His farm, too, was a failure, and the remainder of his short life was neither happy nor creditable. Oliver Wendell Holmes has written these beautiful lines about him:

The lark of Scotia's morning sky!
Whose voice may sing his praises?
With Heaven's own sunlight in his eye,
He walked among the daisies.
Till through the cloud of fortune's wrong
He soared to fields of glory;
But left his land her sweetest song,
And earth her saddest story.

Robert Burns died, July 21, 1796, at Dumfries, where he was buried. It is not for us to condemn in him the follies for which he paid by his untimely death, but rather should we admire the great genius that gave to the world so precious a gift of immortal song, and honour those fine qualities of courage, independence, and manly energy which we find abundantly in the best expressions of his mind.

Another great poet, who was twenty-six

Lord Byron

Percy B. Shelley

John Keats

Lord Tennyson

Robert Browning

Elizabeth B. Browning

years old at the time when Burns died, but who had not yet become famous, was William Wordsworth. He was born at Cockermouth, in Cumberland, on April 7, 1770, and the greater part of his long life was passed in the beautiful Lake District, not far from his place of birth. The life of Wordsworth was, happily, the very reverse in every respect from that of Robert Burns, and, as a consequence, although he lived to be eighty years, there is less to say about him.

THE YOUTHFUL DAYS OF WILLIAM WORDSWORTH, AND HIS FIRST BOOK

It often happens that the lives of men who have been foolish or unfortunate, and have died while still young, are more interesting to tell than those of men who have lived long and happily. Wordsworth came of a good family, and, his parents dying when he was young, he was well looked after by his uncle, being sent to a private school, and later to Cambridge University.

As a young man, Wordsworth spent some time in Switzerland and in France during the distracted period of the French Revolution. When he was twenty-three, he published his first modest book of verse, in which he describes some of the sights he saw abroad. His book did not attract great attention. But here and there some persons of good taste—and particularly his younger brother-poet, Samuel Taylor Coleridge—read it, who realised that its writer had the gift of true poetry. Simplicity of words, combined with lofty thought, and the truthful picturing of natural scenes, were the ideals at which the young poet aimed, and these, throughout his long life, he always strived after—if not always successfully.

WORDSWORTH'S SERENE AND HAPPY LIFE AS AN HONOURED POET

While his friends would have had him become a clergyman, he seems to have been more inclined to the law and literary work, and, coming into a small legacy at the age of twenty-five, he was, for a time at least, relieved of the need to earn his living. A few years later, the payment of a large sum of money, which the Earl of Lonsdale had owed Wordsworth's father, provided the poet with a sufficient income, so that he was free to give all his thoughts to his beloved art of poesy. He had settled with his sister Dorothy in a cottage at Grasmere, and their companionship was not disturbed by his marriage, in 1802, and is one of the pleasantest chapters in literary friendships. Wordsworth was, indeed, fortunate in many ways; he never knew the pinch of poverty, his friends were many and faithful, and his whole life was serene and happy, flowing like a gentle stream through green pastures. He was honoured and admired by the great men of his own day, and, on the death of his friend Southey, he was appointed Poet Laureate. He died on April 23, 1850, and was buried in the churchyard of Grasmere. Of all English poets, he was perhaps the most unequal, for, although he wrote much that was perfect, he wrote a great deal that was feeble and colourless; but as a writer of short poems, called sonnets, no English poet has ever excelled him.

SAMUEL COLERIDGE, THE DREAMY POET WHO WROTE "THE ANCIENT MARINER"

Samuel Taylor Coleridge was two years younger than his friend Wordsworth, having been born in Devonshire, on October 21, 1772. He was the youngest child of a poor country vicar, and his schooling was received as a charity boy at the old Christ's Hospital in London, perhaps better known as "The Bluecoat School," because of the uniform of its scholars. He was a remarkably apt and brilliant scholar. In habits he seems to have been the dreamiest of boys, but his dreams were born of his deep and intelligent interest in the great works of literature. At Cambridge University he gave promise of his remarkable powers, but, getting into debt, he enlisted in the dragoons, for which service, of course, he was totally unfit. His captain released him after a few months, on discovering that his recruit was better fitted for the study than the barracks, and he returned to Cambridge for a time.

We next find him at Bristol, with his friend Robert Southey, dreaming bright dreams of a new and happier life across the Atlantic—dreams never to be realised. Still hard pressed for the means of life, he married and settled down for some three years in a Somerset cottage, writing in this period some of his finest poetry. "The Rime of the Ancient Mariner" and "Christabel" were two of his poems written here.

"The Ancient Mariner" is one of the most beautiful and perfect things in English literature. It describes, in the simple, unaffected style of the old ballads, the fateful voyage of a ship at sea, whose disasters were supposed to have followed upon the shooting of an albatross, according to an ancient superstition of sailors. Although Coleridge had no personal experience of seafaring, all the men of letters who have themselves lived the sailor's life are at one in considering "The Ancient Mariner" the finest of all the poems that have attempted to reproduce for us the mystery of the sea. This proves that the poet, by the exercise of imagination, can know, and make known to his fellow-men, the mysteries of Nature, without having gone through the actual experiences in his own person.

COLERIDGE'S LAST DAYS AND THE POETS HE INFLUENCED

It was largely due to the kindness of friends that the life of Coleridge was made possible. Left to himself, incapable of conducting his own affairs in an orderly way, thriftless and slothful, he would probably have sunk into abject poverty and died obscurely; but his friends, who admired his great genius, sheltered him, caring both for him and his family. It was in the house of such a friend at Highgate, with whom he had lived for some nineteen years, that he died, on July 23, 1834.

Immensely admired by all the great men of his time, Coleridge had exerted a power over his fellow-poets even more remarkable than the volume and beauty of his own poetry. Among those who thus came under the spell of Coleridge were Byron, Shelley, and Keats, and, although they came a little later, we might say the same of Tennyson and Browning. Thus, all these great poets, who were alive at the same time, were in some way his followers, and so we can measure his profound influence.

The story of Byron is almost as sad as that of Burns. He was born to unhappiness. His father, a drunken officer of the Guards, was a nephew of the fifth Lord Byron, and his mother was a Scottish lady, who was singularly incapable of rearing her child happily. George Gordon Byron had been born in London, on January 22, 1788, and was there left with his mother when his father went abroad, never to return. His mother took her little lame boy—for he had been born with a deformed foot—to Aberdeen, to be near her own friends, and there his early life was passed; but when, in 1798, his grand-uncle died, and he became Lord Byron, he returned with his mother to England, where his education was continued at Harrow and, later, at Cambridge University.

THE YOUTH OF THE UNHAPPY LAME BOY, THE FAMOUS LORD BYRON

He was a headstrong and passionate youth, and his behaviour at college was marked by much foolishness; but the power of poetry was in him, although his first book, "Hours of Idleness," published during his college days, gives very little promise of the moving and glowing verse he was later to write. Visits to the ancient towns of the Continent, and particularly some travel among the historic scenes of Greece, shaped the young poet's mind to works of romantic beauty, and in 1812 the first half of "Childe Harold's Pilgrimage," his first great poem, and the finest of all his writings, brought him immediate fame.

Byron was now in London, as Burns before had been in Edinburgh, the lion of the day, admired and flattered by all sorts of people. He was not, however, happy in his marriage, and his conduct as a man was severely condemned. In the spring of 1816, when he was only in his twenty-eighth year, he quitted his native land for good, and became a wanderer on the Continent, writing many fine poems, which brought him immense sums of money.

BYRON AS A SOLDIER OF GREECE AND THE END OF HIS RESTLESS LIFE

During those years of changing residence, his restless spirit knew but little peace; but the end of his short life became him better than much of his conduct after leaving England. He joined the army of Greece as an officer in its war against its oppressor, the Turk, and if Byron was not fated to die fighting for the freedom of the storied land he loved, he was still in active service when fever overtook him, causing his death on April 19, 1824.

The body of the poet was carried back to England, and conveyed by road to the burial-place of the Byrons at

Hucknall Torkard, near their beautiful home of Newstead Abbey, which has long since passed into the hands of another family. So greatly had the romantic personality of the poet and the glamour of his poetry impressed themselves on his countrymen, that it is doubtful if the death of any other famous poet has ever occasioned so much emotion as that of Byron. Tennyson himself has told us that when he heard Lord Byron was dead he felt that nothing else mattered; and, certainly, when the poet breathed his last, at Missolonghi, one of the most powerful voices in English poetry was stilled.

THE STORMY LIFE AND TRAGIC DEATH OF THE POET SHELLEY

Another poet whose fate was also to become a wanderer abroad was Percy Bysshe Shelley, born on August 4, 1792, near Horsham, in Sussex. Shelley was a fair and beautiful youth, perhaps less manly in appearance than Byron, whose fine head and ardent eyes suggest at once the poet and the man of independent spirit. Shelley, like so many of the young men of his day, had imbibed revolutionary ideas, as a result of the great revolution in France, and with these was united in him an unhappy revolt against the teaching of Christianity. The result was an ill-ordered and unrestful life, for, though his poetic genius greatly enriched our English literature, with such fine works as "Prometheus Unbound," "Adonais," and the "Ode to the West Wind," we cannot help feeling that his life was unhappy and his end tragic. He was drowned off the coast of Italy, on July 8, 1822. His body was washed ashore near Viareggio, and it was cremated in the presence of some friends, one of whom was Lord Byron, his ashes being placed in a casket, and afterwards interred in the Protestant cemetery at Rome.

JOHN KEATS, ANOTHER GREAT POET WHOSE SUN WENT DOWN TOO SOON

In that same burial-ground lie the remains of another great English poet, who was a friend of Shelley, and who had died in the year before the latter was drowned. This was John Keats, who was born in London, October 31, 1795. Though only the son of a livery-stable keeper, and doomed to die before he had reached the age of twenty-six, he had yet, in his short life, by the grace of genius, made his name immortal. His poetry has the curious quality of being at once classical and natural. That is to say, steeped in the knowledge of the ancient writers upon whom the great poets of the Elizabethan era had modelled their verse, Keats wrote with all the artificial beauty of the Greeks, while yet he contrived to convey a sense of the freshness and sweetness which comes only direct from the love of Nature, as we find it in Chaucer and in Burns. One of his finest poems, "To a Nightingale," is on page 2722. He died of consumption while at Rome, on February 23, 1821.

Unlike the last three poets of whom we have been speaking, the next great writer who calls for our attention was to enjoy a long life of serene happiness. Alfred Tennyson was born at Somersby Rectory, in Lincolnshire, August 6, 1809, being the third of six sons. Although his name is pre-eminent among the poets of the nineteenth century, had he died at the age Keats was when he passed away, it is doubtful whether he would have been so well remembered to-day, for Keats at twenty-six had given us even finer gems of poetry than Tennyson had produced at the same age. This will serve to show us how much the world must have lost by the untimely death of Keats.

THE YOUTHFUL DAYS AND EARLY WRITINGS OF ALFRED TENNYSON

Tennyson was brought up in a bookish atmosphere. His father, to whom his early education was due, was a man of literary taste; both his elder brothers were poets. At Cambridge he gained a medal for a poem, and in 1826, nearly two years before going to the university, he had joined his brother Charles in publishing a volume entitled "Poems by Two Brothers," which has long been one of the treasures of book-hunters. He was thus a poet at sixteen, and a poet he was bound to continue, as poetry was the passion of his life. His first independent work, published in 1830, and a second series two years later, were received so coldly by the critics that nearly nine years elapsed before he ventured to publish another; yet in these books were such poems as "The Lady of Shalott," "The Lotus-Eaters," and "The Queen of the

WHEN TENNYSON WAS A YOUNG MAN

The proper title of this charming, old-fashioned picture by Frank Stone is "The Duet," but it is particularly interesting for the portrait of Tennyson as a young man which it contains. The young poet is seen standing in a leaning position behind the settee, his thoughts apparently borne away on the wings of the melody.

May," which have long been esteemed among the finest examples of his poetry.

Meanwhile, he engaged himself on works which were destined to conquer not only the literary critics, but the whole reading public. When, in 1842, he published two volumes containing "Locksley Hall," "The Gardener's Daughter," "Lady Clara Vere de Vere," and many other poems of the rarest beauty, thrilling with a sweet new music, and mysterious with the glamour of old romance, he had quietly won the battle of fame, and was hailed on every hand as England's new king of poets. Wordsworth was then the commanding figure among the poets, but even he did homage to the genius of Tennyson.

His fame established, the remainder of Tennyson's long life was full of honour and of fine work. His was not a wild and wayward nature, so he was happily spared the disasters that have overtaken so many of the poets. Yet he did not escape the struggles that all who have not inherited riches have to face, for he was a man of forty before he felt he could afford to marry. He took this step in the same year that he was appointed Poet Laureate, in succession to Wordsworth, and the year was also notable in his life by the publication of one of his greatest works—"In Memoriam." On page **2153** we print some verses from this long and beautiful poem, in which Tennyson mourns the loss of a dear friend, Arthur Henry Hallam, the son of a great historian, who had been untimely cut off. The greatest achievement of his later life was the writing of the "Idylls of the King," in which the old legends of King Arthur are told again, and invested with a new beauty. He also wrote a number of plays, but, although most of his poetry is worthy to rank with the best of Shakespeare, he lacked the dramatic power in which the master poet was without a peer.

Tennyson, after his marriage, settled for a time at Twickenham, on the Thames, but in 1853 he went to live at Farringford, near Freshwater, in the Isle of Wight, where much of his

life was passed, and in 1870 he became the owner of a singularly beautiful house, specially built for him at Aldworth, in Sussex, set on the edge of a woody hill, and looking clear across the rolling downs towards the south coast. Here, and at Farringford, he enjoyed many years of serene and happy life, the undisputed king of the literary world of his day. In 1884 his services to English literature were recognised by his elevation to the peerage as Baron Tennyson of Freshwater and Aldworth. On October 6, 1892, he died at Aldworth, and was buried in Westminster Abbey. His life has been written by his son, the present Lord Tennyson.

There was another great poet, very different from Tennyson in many ways, whose life ran its course with that of Tennyson. Robert Browning was born in London, May 7, 1812, so that he was but three years the junior of Tennyson, who also outlived him by three years, Browning dying on December 12, 1889.

A COMPARISON OF THE TWO GREAT POETS BROWNING AND TENNYSON

Like Tennyson, Browning began to write poetry at a very early age, his first published work having been written when he was nineteen. His early education was chiefly derived from travel abroad, and Italy, as we have seen in the case of other poets, had much to do in influencing the poet's mind.

Like Tennyson, he sought to inspire his fellow-men with hope, but there is, perhaps, in his poetry a stronger feeling of courage than we find in Tennyson. His verses are rugged and unhewn, like the rocks on the seashore, while Tennyson's are polished and sweet with music, like a beautiful Italian garden with its fountains. He is not so easy to understand at times, as he often tries to express more thought than his words can carry. In short, he is to be considered a greater thinker than a poet, although we have seen that in such pieces as "The Pied Piper of Hamelin," on page 344, and "How they Brought the Good News from Ghent to Aix," on page 2291, he could tell a moving story in clear and memorable words.

There were many contrasts in the characters of Tennyson and Browning. While the one loved to appear a poet in his person, as well as in his works, the other endeavoured always to be regarded as an ordinary man of affairs. Tennyson was somewhat inclined to withdraw himself from his fellow-men; Browning thrust himself boldly into the everyday life of his time, although we cannot suppose that he had a lesser love of poetry than Tennyson had. But there is little doubt that Tennyson was the greater poet of the two; his works must outlast those of Browning in the affections of most readers.

ELIZABETH BARRETT BROWNING, ENGLAND'S GREATEST WOMAN POET

Some people even consider, though not quite wisely, that Browning's wife, whose maiden name was Elizabeth Barrett, was a finer poet than her husband. It is true that, although Browning was thirty-four when he married, and had written several notable works, his wife's fame was then greater than his own.

Mrs. Browning was indeed a remarkable woman. Born in Durham, March 6, 1806, the daughter of a wealthy landowner, she was so clever as a child that, when a girl of ten, she could read the poets of Greece in their native language, and at fourteen she had herself written a poem of some merit. An injury received when she was about eighteen made her an invalid for many years, during which poetry was the solace of her life. Her gentle nature, her warm love of the poor and oppressed, and her steadfast faith in the goodness of God, are all admirably expressed in her sweet and eloquent poetry, of which "Aurora Leigh," a work of considerable length, is perhaps the finest and purest flower.

THE LAST DAYS OF ROBERT BROWNING AT HIS PALACE IN VENICE

When the Brownings were married, in 1846, they left England, and took up their home in the lovely Italian town of Florence, about which we read on page 2779, and there, on June 30, 1861, Mrs. Browning died. Her husband survived her for many years, and towards the end of his life he removed to one of the fine old palaces that stand along the Grand Canal in Venice, as seen in the pictures on page 3017. There Robert Browning passed away, on the very day that his last book of poems, "Asolando; Fancies and Facts," was published; but his body was taken to England, and buried in Westminster Abbey on the very last day of 1889.

The next Men and Women begin on 3981.

HOW TO KNOW SAILING SHIPS

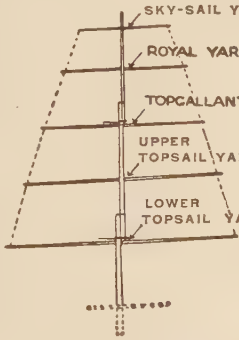
CONTINUED FROM 3826

To hear men talk about sailing ships is sometimes very confusing. Many boys and even men who live by the sea, and see ships sail along the coast and come into harbour, do not know the names of the various kinds of ships, and cannot distinguish one kind of ship from another. They may hear sailors and other people talk about a schooner and a brig and yawl, but they cannot tell one of these things if they see one. There may be an excuse for this sort of ignorance if we have never had the opportunity of learning what the different kinds of ships are like, but there will be no excuse for *us* if we do not know them, because this article and the pictures in it have been specially prepared in order that we may learn many things worth knowing about the rig of sailing ships.

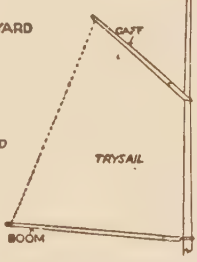
It is necessary to begin by understanding something about masts and sails. A mast is a long pole sticking upright, or nearly upright, in the ship and made to carry a sail, or several sails. The masts stick up through the deck. A mast is always tapered, its lower end is very securely fixed to the bottom part of the ship, and a rope, usually a wire rope—and sometimes more than one rope—has one end attached to the mast near the top, and the other end attached to the sides of the deck or to another mast. If there is only one mast in a ship it is called simply *the mast*. If there are two masts the front one is called the *foremast*, and the second one is the *mainmast*. If there are three masts the third is called the *mizzen-mast*, and if there is a fourth mast it is called the *jigger-mast* if it has no yards, and the *after-mizzen mast* if it has yards. We shall see what yards are presently.

Every sailing ship has a *bowsprit*, that is, a spar sticking out in front in a horizontal, or almost a horizontal, position.

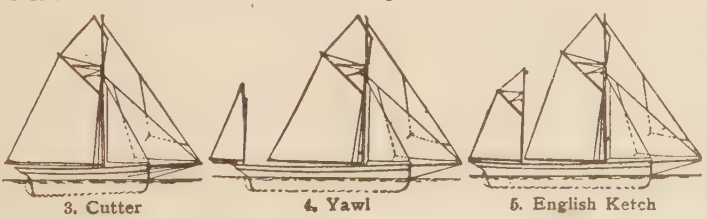
The sails could not spread out on the masts alone; there must be spars attached to the masts to assist in carrying the sails. There are three kinds of such spars, and they are called *yards*, as shown in picture 1, and *booms* and *gaffs*, as shown in picture 2. The yard is a spar that goes across the mast; from it and in front of the mast the sail hangs downwards. In its normal position the length of the yard is across the ship, but, of course, it can be moved around to any angle so as to catch the wind. The boom is a horizontal spar, and it stretches backwards from the mast towards the stern, or back, of the ship. It also can be moved around so as to spread the sail to catch the wind from any quarter. The gaff is something like a boom, and it holds at the top the sail which the boom holds below. Its position is not horizontal; it slopes upwards towards its point. The spars on the masts are called by the names of yards. The fore-yard is the yard on the fore-mast, the



1. Yards



2. Trysail



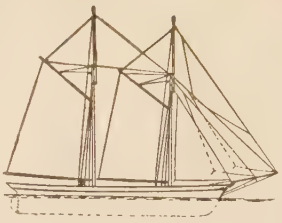
3. Cutter 4. Yawl 5. English Ketch

6. English schooner.

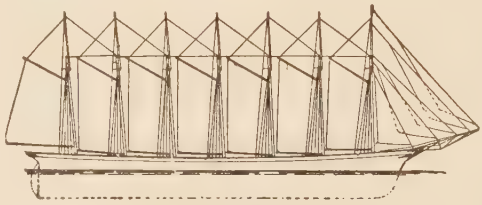
mainboom is the boom on the mainmast, the mizzen-gaff is the gaff on the mizzen-mast and so on. The sail between a boom and a gaff is called a *trysail*, and is illustrated in picture 2. A mast cannot have more than one boom and one gaff, but it may have several yards. The bottom yard is always called the *lower yard*. The one above it is the *topsail yard*, or if the topsail is in two parts, the two parts are called the *lower topsail yard* and the *topsail yard*, respectively. Above the topsail is the *topgallant yard*, or if the topgallant sail is in two parts, the two parts are called the *lower topgallant yard* and the *topgallantyard*, respectively. The yard above the topgallant yard is called the *royal yard*, and if there is one higher still, it is known as the *skyscraper yard*. Now, if we remember these points about masts and sails we are ready to consider the *rigs* of various ships. The name given to the sails and their disposition on the various masts and spars is the *rig*.

Small sailing ships and yachts have what is called the *cutter* rig, which is seen in picture 3; there is only one mast, and the *mainsail* is stretched between a boom and a gaff. The *yawl* is very like a cutter, but has a very small mast behind the mainmast, as seen in picture 4. The yawl is generally a little larger than a cutter.

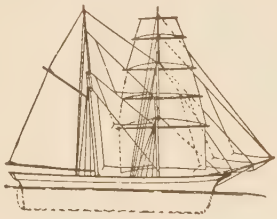
The *ketch* is the same as a yawl, but the rear, or after, mast, is larger. It is seen in picture 5. The rig of the *schooner* is the most common on sailing ships, and although steamers may not have sails at all, if they have sails these are the schooner rig. There are two kinds of schooner rigs: the ordinary schooner rig, and the fore-and-aft schooner rig. The ordinary schooner rig, which is seen in picture 6, has a foremast with a topsail and topgallantsail, but a trysail instead of a lower yardsail, and on the rear, or main, mast there is a trysail and topsail. Sometimes the ordinary schooner rig has also on its mainmast top and topgallantsails, but mainmasts with trysail and topsail only are the more common.



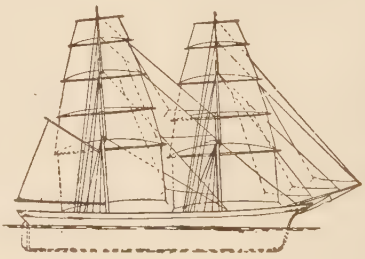
7. Fore-and-aft schooner



8. Fore-and-aft seven-masted schooner

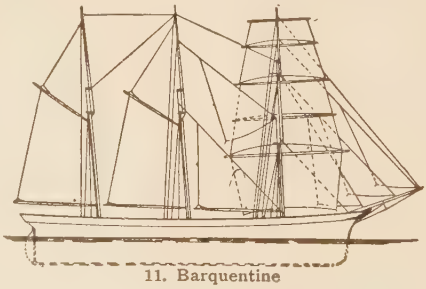


9. Brigantine

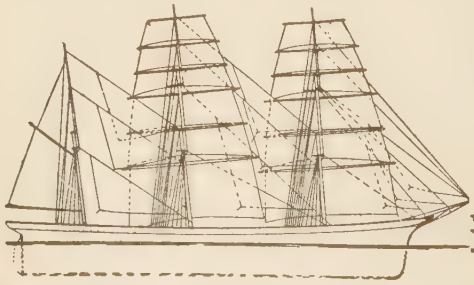


10. Brig

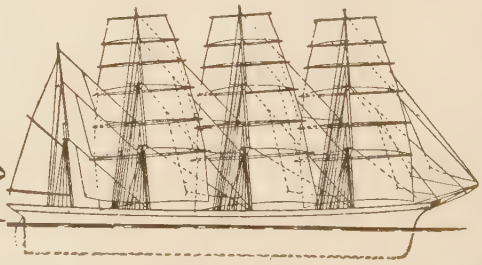
The fore-and-aft schooner rig has no yardsails but only trysails, which are generally uniform on all the masts. In picture 7 we see a two-masted schooner with fore-and-aft sails, and in picture 8 is shown a seven-masted schooner with fore-and-aft rig. A schooner may have as many masts as may be found convenient and still be a schooner. If a schooner of the ordinary rig type has more than two masts, the foremast only has yards, the remaining masts, whatever their number, having trysails only.



11. Barquentine



12. Three-masted barque

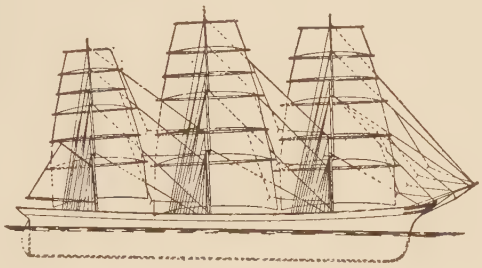


13. Four-masted barque

The *brigantine rig* is the same as an ordinary schooner rig, except that the foremast has no trysail but only yards, as seen in picture 9. It may have fewer yards and yardsails than are seen in the picture, but it has no trysail on the foremast. The brigantine rig is not very common nowadays, and when it is found the ship has never more than two masts.

The rig of the *brig* is another rather rare type. It, also, is found only on two-masted ships, and, as seen in picture 10, it has a main, or rear, mast like the foremast of an ordinary schooner rig, with yardsails and one trysail, and a foremast with yardsails only.

The barquentine rig is seen sometimes in three-masted sailing ships. It is as seen in picture 11, which shows that it is like the brigantine with a mizzen-mast added to it.



14. A full-rigged ship

The most popular rig for modern sailing ships is the *barque*. It requires not fewer than three masts. The mast nearest the stern has a trysail but the other masts have yards and yardsails. Picture 12 shows a three-masted barque, and picture 13 shows a four-masted barque.

For very large ships barques are sometimes made with five masts, in which case the front four are rigged alike with yardsails, and only the fifth mast has a trysail.

Finally, there is a *full-rigged ship* which must have not fewer than three masts, and has sometimes four masts. Only one full-rigged ship with five masts has been built. All the masts on the full-rigged ship have yards and yardsails, and the mast nearest the stern has a trysail as well. A full-rigged ship with three masts is illustrated in picture 14.

ICES MADE WITHOUT A FREEZER

In hot summer weather few things are more cooling and refreshing than ices. They cost but little, and can be quite well made at home. If we all knew how easily a delicious ice could be made without an elaborate freezing machine, we should more often want to make one. Let us see what we can contrive, even if we have no freezing machine.

First, we shall want a round tin with a lid that shuts down tight. A coffee or syrup tin would do. Then we want a large square tin biscuit-box or a wooden pail. This is to hold the freezing mixture, with the syrup or coffee tin in which we are going to make our ices in the middle of it. Before doing so we must see how and why the ice is formed inside the smaller tin.

We know that water freezes below a certain temperature, but if we chop up a little ice and pour on it a little water and sprinkle it with coarse salt, we get a very low degree of cold indeed, because the salt acts chemically on the ice and intensifies its power to freeze. So any liquid, even though it be shut up in a tin, will freeze when buried in the freezing mixture, if left there long enough. It would turn into a block of ice before long if it were not hindered from doing so. How can we prevent it? The liquid will freeze first around the inside of the tin, and to stop that we must stir it and scrape the tin at the side, just as, but for a different reason, we stir the milk in a saucepan. A wooden spoon will do for this, but it must be perfectly clean, and long enough to be grasped with the hands.

The larger tin has a layer of chopped ice and salt placed at the bottom; the smaller tin is placed on that, and ice and salt are piled around it up to the brim. The ice should be just double the weight of the salt. The mixture for the ice is placed in the smaller tin, the lid put on, and a blanket wrapped round the outside of the whole. It is then allowed to stand for some time. Removing the lid, we take our wood stirrer, and scrape it round and round the inside of the smaller tin, to prevent the mixture from freezing solid; and then we replace the lid. We must be careful not to let the salt and ice get into the smaller tin, or our ice-cream will be spoilt. The ice-cream should, of course, be made in a cool place.

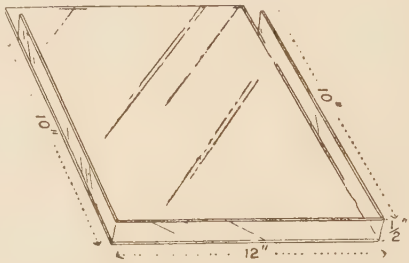
And now what kind of ice shall we make? We can choose a water ice, made with water, or an ice-cream, made with cream. An ice-cream is nicer, but costs more. We may like to make some of both kinds, or custard can form a substitute for the cream, and fruit, either fresh or in the form of jam, can be added.

Water ices can be made by mixing some syrup—sugar boiled in water in the proportion of 1 lb. to 1 pint—with a fruit-juice from pressed strawberries or raspberries. There should be twice as much syrup as fruit-juice, and it is better to test by tasting. An ice-cream without cream is made from a custard in which are a tablespoonful of Swiss milk, half a pint of milk, the yolks of two eggs, and sugar if desired; this may be flavoured with vanilla or essence of almonds, and put in the freezer. Or, instead of flavouring with vanilla or almonds, we can take half a pint of the custard, add to it a quarter of a pound of jam, and if this contains seeds, rub it through a sieve, and then freeze it. Cochineal will make the ice a deeper red.

Should it happen to be the fruit season, an ice from strawberries or raspberries will certainly be liked. We get half a pound of fresh ripe fruit, take off the stalks, add 4 oz. powdered sugar, press this with a fork, and squeeze it through a sieve. It now forms a thick juice, to which we add either the custard described above or half a pint of fresh cream, and, if we like, a little lemon-juice. The mixture is now quite ready for the freezer.

HOW TO KEEP ANTS AS PETS

THE habits of ants are so interesting that men of science have spent a great part of their lives studying them and their habits. We read something about these wonderful little creatures in that part of this book that begins on page 2941, but we may ourselves keep ants as pets in our drawing-room, and very interesting they are. The glass case in which ants are kept in the house is called a *formicarium*, a word that is made up from *formica*, the Latin or scientific name for the ant. Formicariums may be bought all ready and complete at some shops, but it is much more interesting to make our own, and as it is easy to do this, we will first of all see what is needed.



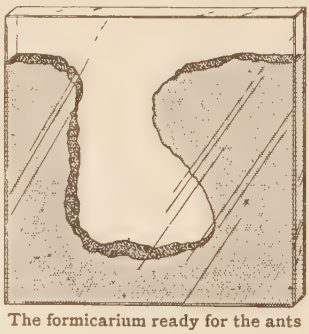
How the glass case is built up

We must get two sheets of glass, say, twelve inches square, two strips of glass twelve inches long and half an inch wide, and two strips ten inches long and half an inch wide. These may be bought at any glazier's, cut to the sizes named, for a few cents, and ordinary window-glass will do very well. Now we must take one of the squares, and fasten the two ten-inch strips and one of the twelve-inch strips round the sides, flush with the edges, as shown in the first picture. Either glue or seccotine may be used for this purpose. Then, when the strips are dry, we must stick the other sheet of glass on the top of them, so that we shall have a shallow box without a lid, and with the narrow sides not reaching quite to the top of the wider sides of the case.

The formicarium is all ready to receive the earth from which the ants are to form their nest or camp. The very best mould for this purpose is, of course, that to be obtained from an ant-hill, and this we can get in almost any garden or field in town or country. The earth may be put into the glass case by pouring it in at the top through a paper funnel, made in the same way that a grocer's sugar-bag is made. Sufficient earth is needed to half fill, or a little more than half fill, the formicarium, and a vacant space should be left in the centre with passages to the openings above the ten-inch strips. The top, which consists of the remaining twelve-inch strip of glass, is then put on the top, and glued or pasted in place. We now have our formicarium all ready for the ants, with two doorways or openings, one on each side, and the appearance of the case is as shown in picture No. 2.

We have next to catch our ants. Any kind will do, and we shall probably find what we want in our garden. We must dig down deep into the encampment to find the queen, who can easily be distinguished by her large size. The pictures on page 2945 of this book will perhaps help us. A bottle is a very good thing in which to carry the ants from the garden to the room where we are making our formicarium. Having put the queen in the bottle, we can place with her about fifty worker ants.

The next task is to get these into the glass case. We must close up one of the little doors with rag or wadding. Then, if we take a tea-tray and fill it with water, and stand a dish in the tray and then lay the formicarium on the dish, the ants' new home will be cut off by water from everywhere. We cover the glass case with a newspaper folded up, and lay our bottle on the paper with the cork out. The ants soon swarm out and all over the paper, but we guide the queen ant towards the opening of the formicarium and get her in, when the worker ants will all follow, and that very soon. Directly they are in, we should plug up the doorway with a piece of wadding, and our formicarium is complete. We may, of course, ornament it in any way we like, but this is a matter of taste. The ants will soon get to work, and for hours we may watch them making their homes and performing their various duties without any fear of our getting tired, for there is no more absorbing recreation than watching an ant city being built.


The formicarium ready for the ants

The formicarium should be kept in a shady place, and when not being watched a cloth may be thrown over it. It must never stand in the sun, and it is better to examine the ants by artificial light, as the little creatures do not mind this at all, whereas they do not like daylight, and will soon get out of sight if exposed to it. The earth should be kept moist by squirting a very little water into the case from time to time with a small syringe or a fountain-pen filler. The only food needed by the ants is a little honey placed inside the opening every day or two. A few of the little white creatures that ants make pets of, should be put in the nest, as they act as scavengers, and keep the ant city clean.

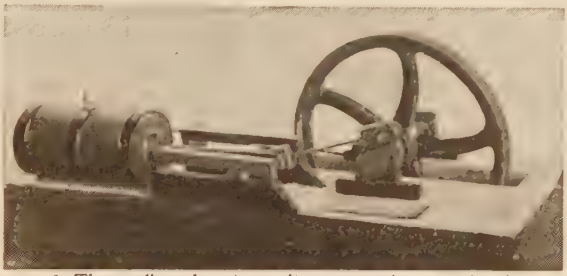
Thus completed, we have one of the most wonderful things that can be seen. The ants will make tunnels and corridors and lanes and rooms, and nurseries for their young ones, with front doors and side doors; and all the different kinds of ants will do their different kinds of work right before our eyes. As they have not the chance to get at another nest of ants, they will do no fighting, which is the least nice of all the habits in which the ants are so like men.

MAKING A CARDBOARD STEAM-ENGINE

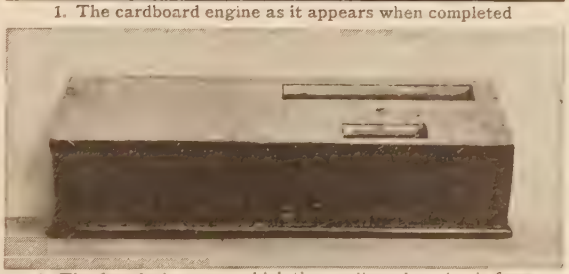
THE model engine shown in picture 1 looks very solid and strong, yet it is made out of cardboard, pieces of wood, bits of a knitting-needle, and other easily-obtained materials. Any boy can build such a model for himself if he will take pains and follow the method indicated in the pictures. The model is of a horizontal engine, such as is used for driving heavy machines in factories, and although it will not actually go by steam, yet its movements are like those of a real, big engine, so that when we have made it, and set it spinning, we begin to understand a good many things about a steam-engine which had previously been very perplexing.

Instructions for the making of cardboard models of various kinds have already appeared in THE CHILDREN'S ENCYCLOPÆDIA, so it will not be necessary to go into all the details of how to cut, bend, and fix cardboard. Perhaps the most difficult part of the model engine to make is its base. Of course, this can be made out of stout cardboard; but a better way is to make it of thin wood, as shown in picture 2. Such a base is really only an oblong box with the lid nailed down tightly, after two oblong holes have been cut in it—one for the fly-wheel and the other for the crank to dip into as it revolves. These holes can very easily be cut out with a fret-saw or a chisel.

We can buy a wheel suitable for the fly-wheel for a few cents, according to size, at any big shop where they sell bicycles and perambulators. Of course, the size of the wheel must be our guide when cutting out the holes in the lid of the box, as well as when making the other parts of the model. If we take a good look at the photograph of the finished engine from time to time as we work, we shall not have much difficulty in making the size of our various parts proportionate.



1. The cardboard engine as it appears when completed



2. The foundation upon which the cardboard engine is fixed

3. Some of the cardboard pieces used in making the engine

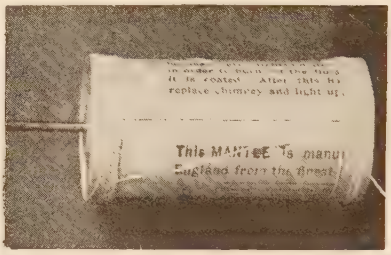
For the cylinder of the engine a piece of cardboard tubing is required. Part of an incandescent mantle box, marked A in picture 3, will serve very well. Then we cut out some circular pieces of card like those marked B and C, and gum these together to form the piston. A length of knitting-needle is now required. This may be cut off by means of a file. It should be fixed to a small piece of cork and securely gummed upright upon the piston as shown in picture 4.

Next we cut two square pieces of cardboard, marked D in picture 3, to form the cylinder covers. One of these must have a round hole bored in its centre, to allow for the play of the piston-rod. We put the piston-rod through this hole, insert the piston into the cylinder, and gum down the square cover. The other square of cardboard must now be gummed to the other end of the cylinder; and when the gum is quite dry, the overlap of the cardboard may be trimmed away at both ends with scissors or a fairly sharp knife.

The two oblong, narrow slips of cardboard, marked E in picture 3, must now be cut out and fitted one round each end of the cylinder. We gum these bands and fix them in place by means of cotton, and the cylinder will look like picture 5. We next need two little circles of card, marked G and H in picture 3, one with a hole in it, to fix at each end of the cylinder. The one marked H should have the hole bored in it by means of a red-hot knitting-needle, and it can then be adjusted, and gummed in place, so that the piston-rod will move out and in without wobbling. Next we make the steam-chest out of one piece of card, as shown by J in picture 3. We bend over the sides and edges, gum them, and tie them together with cotton as in picture 6. The little pieces,

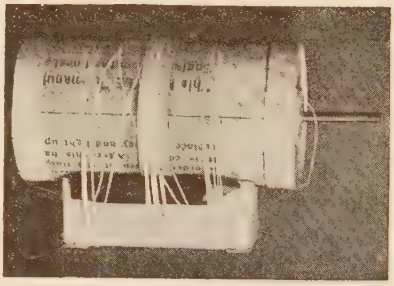
marked K in picture 3, are used to strengthen this steam-chest. When the steam-chest is fixed together and dry, we gum it to the side of the cylinder as shown in picture 7. We bore a hole in one end and fit a piston-rod to it, made from a smaller piece of knitting-needle. We then rub down the edges of the work with fine glass-paper and enamel it — the body of the cylinder bright green, and the bands picked out in black. The cylinder will then look something like picture 8; but we must make and fit the piston-head. The parts for this, marked F and G in picture 9, are best cut out of thinnish wood. They are then gummed and fitted very carefully to the end of the piston. It is now a good plan to gum the cylinder upon its base firmly, because when it is in place we will find out more easily the correct size for the other parts of the model. Parts A, B, C, and D in picture 9, when gummed together, make a guide for the piston-head, as shown at E, of which two will be necessary. The parts of the bearings for the wheels are shown at H and J in the same picture; while K shows them fitted together and bored out to receive the axle of the wheel. We shall find it best to plug the centre of the wheel with wood, and then to bore through the wood a smaller hole, just big enough to receive the axle, which is easily made from another piece of knitting-needle.

4. Piston

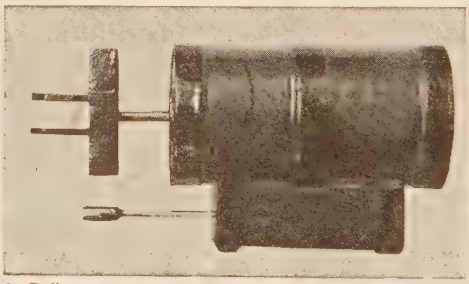


5. Cylinder with bands gummed in place

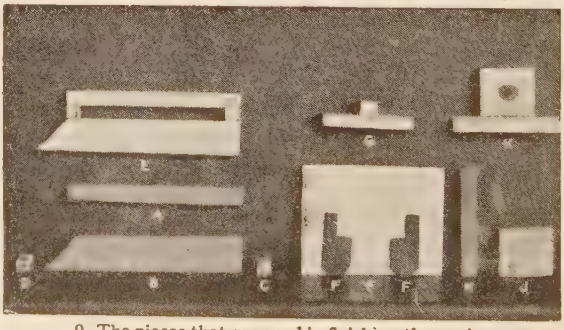
6. Steam-chest



7. The cylinder with steam-chest attached



8. Cylinder, piston, and steam-chest after enamelling



9. The pieces that are used in finishing the engine

If we have followed carefully the above descriptions, we shall find it an easy matter to construct the crank and connecting-rod out of little blocks of wood and pieces of knitting-needle; while we can see how to fit the various parts together by referring to the photographs. When all is completed, we may give the little engine a coat of enamel, using several colours. Of course, we need not make an engine exactly like the one which is here described. Many different kinds of engines and machines can be modelled by using the simple materials which have been mentioned here. We may make a model factory with different machines to do different kinds of work: model boilers, model stokeholes, and so on. The very best way for us to set about making models of any kind is to choose some object that we see almost every day, such as a ship, an engine, a house, or a church, and then to copy it in miniature as carefully as we can. We shall do well to pay particular attention to the general form and outline of what we are copying, as well as to the colours that we use — not worrying about the tiny details. For instance, when we set out to make a model house, we cannot copy every brick in the original, but by means of careful colouring we can make our model look as though its walls are really brickwork. In making model engines we shall do well to bear in mind a few hints which will tend to make our work less difficult. As we have seen, the general materials are wood, cork, cardboard, and knitting-needles. We shall find plenty of nice thin wood, easy to cut, in old cigar-boxes; the paper which is pasted over parts of the boxes should be damped and peeled off. Corks may be taken from empty bottles in the pantry; and cardboard boxes are easily obtained.

SIMPLE WAYS OF MAKING DESIGNS

WHETHER we are girls and are fond of needlework, embroidery, or pokering, or whether we are boys and do wood-carving, modelling, painting with stain on wood, or stencilling, we shall find the constant need of a pattern. Here we shall see how simple it is to make our own designs, which are very much more interesting to work upon than any we can buy.

We are only going to use ordinary, everyday things to help us to make our patterns—three coins to make circles, a quarter, nickel, and a ten-cent piece. also a rule and a piece of lead pencil.

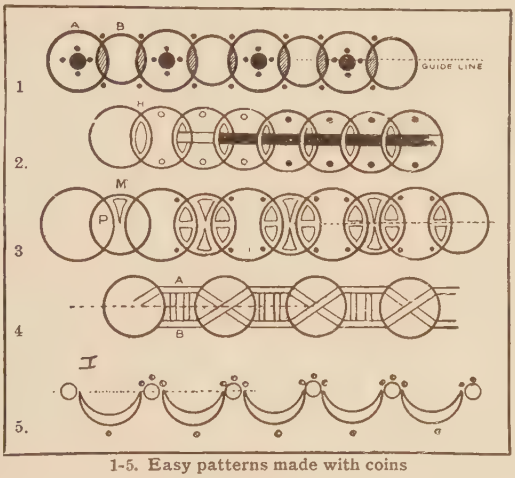
First let us look at picture 1. This pattern is made with a ten-cent piece and a nickel.

To begin with, we must be sure that our pencil has a sharp, long point. We first rule a straight line very faintly. This line is to be a guide only, and not part of the pattern. It is shown as a dotted line in the pictures. Now we take a nickel and place it on the paper over the guiding line, a ten-cent piece on each side, of the line. We should hold it with one finger firmly in position, and with the pencil mark round the edge; remove the coin and we shall find an even circle. In the picture this circle is marked A.

The next circle, B is made with a ten-cent piece, and it overlaps A by one-eighth of an inch. This distance must be marked off on the guiding line with a ruler, before putting the ten-cent piece in position. To do this we must make a little dot on the guiding line one-eighth of an inch away from the edge of the circle—where it crosses the line—and, of course, it must be *inside* the circle.

This dot shows us how far to *overlap* the ten-cent piece when we place it on the line. We must do this each time we have drawn a circle, using the same distance—that is, one-eighth of an inch exactly.

We continue to use these two coins alternately until we have made as long a line of circles as we want. The rest is very simple, because anyone can make dots. We must make fairly big ones outside the circles where they cross, and very big ones in the centres of the big circles. The guiding line helps us to see where the big dots are to be placed, and also to place the two dots on either side. We can guess the other two dots—they come top and bottom—and make up our dots round the big dots. If we colour in the little shapes formed by the circles overlapping, the design is complete.



1-5. Easy patterns made with coins

Now let us look at picture 3. For this pattern we take a quarter and a nickel, and use them in just the same way as in pattern 1, but with this difference—that the overlap is much bigger. In each case it is three-eighths of an inch, marked P in the picture.

The next thing to put in is really easier than it looks, because it is done "freehand." We must carefully follow the outline of the space marked M, making it a little smaller, with the point of this little shape just touching the guide-line. The other shapes in the picture are filled in in the same way. Then the dots are added—but we must be careful not to make them too small.

Picture 2 shows our next pattern, which is made with a nickel only, and the overlap distance is a quarter of an inch. The spaces formed by the overlap are filled with smaller spaces, outlined in pencil, just as the last pattern was done; then a line is ruled along *each side* of the guide-line, a very short distance away, and made to look as though it threaded itself in and out of the circles by rubbing out with india-rubber the part supposed to be behind. The dots are put in last. Pictures 4 and 5 show two more patterns, both being made with a nickel, much in the same way as the previous ones. For number 4 we must make the circles three-eighths of an inch *apart*, measuring the distance as usual along the guiding line, then drawing the two lines A and B level with each side of the guiding line, and a quarter of an inch away from it. Next we add the connecting bars, two between each circle, and finally join up the outside lines *across* the circles, drawing them so that one seems to go underneath the other.

The half-moon in picture 5 is made by marking only *half*-way round the nickel and then shifting it up a little—about one-eighth of an inch—and marking another half-circle, joining the first one at the points of the moon.

A design for a sideboard cloth

OUTDOOR GAMES FOR BOYS

PRISONERS' BASE

THE playground, or part of it, should have four spaces marked off—one in each corner, as seen in the picture. The distance between the prisoners and homes should be not less than twenty yards. The players divide themselves into two parties, A and B, each party selecting a captain. They then go to their separate homes, and one of the captains sends out "a man" to the place marked in the centre, where he calls the words, "Chivy, chivy!" Out darts one of the enemy to capture him before he can reach home again. But this pursuer has hardly started when one of "Chivy's" friends rushes out to catch the pursuer. Thus one after another all the players leave home, but no one must on any account try to touch any boy except the one he left home to follow. Above all, each should not forget that while he is seeking to capture the enemy, another of the enemy is seeking to catch *him*. This makes matters exciting. A prisoner is made by simply touching a boy; and once this is done the toucher is safe until he has taken his captive to gaol. He may then walk "home" and wait to be ordered out again by his captain. Prisoners are released by one of their own side touching them as he runs by the prison; and if there are many inside, they may join hands and stretch out to meet their friends, so long as the last in the line keeps one foot in gaol. The side that succeeds in making all the others prisoners wins the game, but it has to be a very clever captain who can direct his men so as to manage to do this.

FLY THE GARTER

TO start with, all the players make a running jump, and the one whose jump is shortest has to "give a back" for the others. A chalk line, called the garter, is drawn, and standing close beside this he bends his back and tucks in his head. When the others have gone over him as in leap-frog, he is told to "foot it"—that is, move away from the line the length of his own foot, and bend down again. This time, in going over, each player must start his jump from the "garter," and if all succeed in doing this, the "back" moves on another foot for the next turn. By and by the distance from the garter becomes too great for one of the jumpers; and the first to make a false leap must take the place of the "back," who then joins the others.

FOX IN THE HOLE

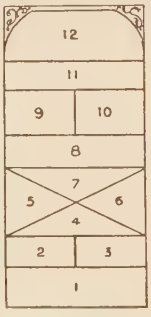
THE "fox" stands on a piece of ground marked off for him to live in. He is allowed to carry a knotted handkerchief for self-defence. When the hunters come to attack, he hops out to meet them on one foot. During the battle that follows he must not put his second foot to the ground, or, if he does, he will be basted home again without the right to hit back. If, however, he touches one of the enemy with his knot while hopping, the one so touched is basted by the rest into his home and becomes fox in his stead. While in his home the fox is quite safe from attack.

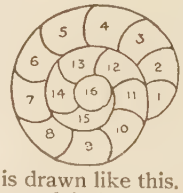
PEE KU

HALF the number of players join hands in a circle, forming what is called a fortress, which the other half seek to take by forcing their way into the middle. The defenders must not loose each other's hands, but may raise them or lower them to stop the attackers getting over or under. They may spread themselves out or draw together in a closer circle when danger is near, and they may change their positions to stop anyone crawling between their legs. If an enemy gets through, he may assist his friends who are trying to follow him, and when half the number are within the fortress, it must "haul down its flag and surrender" to the victorious party.

HOP-SCOTCH

THE game of hop-scotch is played in different ways, but the way which we shall see here is the usual one. We first draw on the pavement of the playground with chalk a plan like this. The larger divisions are about two feet wide. The first player then stands at a short distance and pitches a flat stone or piece of shell into No. 1. If it settles properly in the space, he hops after it and kicks it out again without putting his other foot to the ground. Returning to the starting place, the shell is again tossed, this time into No. 2, and the player hopping after, kicks it out once more, but through No. 1. This action is repeated through every division up to 12, unless the shell settles on a line or is pitched into the wrong division. In either event the player stops and the next player takes his turn. Though only hopping is allowed, any player who gets as far as division 8 may rest by putting one foot in No 5 and one in number 6, but must go on hopping when he turns to kick the shell out again. On each return journey he may hop and kick as often as he likes, except when the shell has been tossed in No. 12—or the cat's head, as it is sometimes called. *That* time he must kick it out at one kick right through all the divisions. But if he does so, he has won a game, and his hopping labours are over. In French hop the plan on the pavement is drawn like this. The shell is placed in No. 1, and the hoppers kick it through each division till No. 16 is reached. After a short rest it is kicked back the reverse way to No. 1 and out.

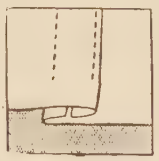




A BATHING-GOWN A GIRL CAN MAKE

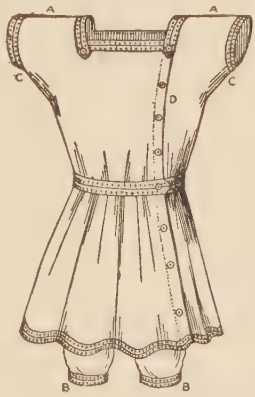
A COSTUME suitable for sea-bathing for a girl who does not swim needs to be of a different pattern from one to be worn by a swimmer, when there should be no short skirt to cling round the legs and hamper the movements when swimming; but, on the other hand, a tightly clinging combination suit does not look well for sea-bathing, unless, perhaps, for very little girls. Many people bathe from their own tents and bathing-huts, and have a stretch of sand to run over before reaching the water, so that some kind of tunic skirt is necessary.

In the costume shown in picture 2, both these purposes are served. The upper part and the knickers are *cut in one piece*, and the little tunic skirt is cut separately, and fastened on by buttons and buttonholes. For the material, we should choose a double-width one of serge or Oxford shirting; both wash well and are durable. The shirting has the advantage of being not only washable, but strong and soft; it may be had in a plain blue or striped pattern. Serge in several colours is suitable, and looks well trimmed with a fancy braid. We will make our costume of dark blue serge, and trim it with a white fancy braid. Enough braid will be required to edge the skirt, knickers, sleeves and neck, as well as to form a waistband.



1. Seaming

The quantity of the serge depends, of course, on the size of the figure, and a near estimate of it can be made from the shape of the under-garment a girl usually wears, allowing for a very loose fit. Indeed, this may be taken as a correct guide for making the costume. The material is folded lengthways—so that the selvedges run down the length of the garment—the fold coming where the shoulders are, marked A A in the picture. A square neck is then cut out of the centre of the fold; if a high neck is preferred, it can easily be sloped in a curve in front and back.



2. The costume complete

To form the short sleeves, the material is cut the required length and curved in under the hollow of the arms, and thence to the waist-line, brought out again slightly below it, and taken in again down to the knees. The knickers part, which is not shown in the picture, does not fasten anywhere, there being plenty of room to slip in and out of the suit through the opening—marked D—at the left side of the front, which is slit down to the waist-line.

To finish off this opening, a false hem is put on to the right side of the slit and double-stitched across at the bottom to make it firm. Through this broad hem five buttonholes are worked. The way to put on a false hem is explained on page 835. A narrow hem is made along the edge to the left of the opening, and white bone buttons are sewn along the right side of it. The hem is made firm to hold the buttons by laying a strip of black tape along the back, and hemming it on in such a way that the stitches do not show on the right side.

And now for the joining up of the sides. From the sleeves to the knees, from C to B, the garment is seamed, and also where the knickers are cut up to form the legs. Seaming is done by a sewing-machine in this way. Turnings are made at the two edges of the material; these are placed together, as shown in picture 1, and machine-stitched near to the turned edges along both sides. If it is inconvenient to machine-stitch the seams, they can be run and felled. The seam inside the two halves of the knickers is worked in the same way. The extra fulness at the waist is held in by the band shown in the picture.

The neck is edged back and front with straps of double braid, and two other straps, pointed at the ends, pass over the shoulders and are sewn down with buttons over the ends of the other two. Braid is put round the short sleeves and the bottom of the knickers.

A double row of braid forms the waistband, which can be strengthened by a piece of the serge at the back, and is then stitched along *its upper edge* for an inch or two to the middle of the waist-line at the back to hold it in position. The waistband is fastened by a button and buttonhole, as seen in the drawing. The skirt is very simply made, for it is cut in a strip, sufficiently long to make the fulness suitable for the figure, and gathered into a narrow waistband of the serge, in which a few buttonholes are made. Hems, one broad and one narrow, are made at the ends. Three buttonholes are worked in the broad one, and corresponding buttons are sewn on to the narrow one to continue the line at D. Buttons to correspond should be sewn on to the under-garment, just under the waistband, so that they are hidden when the skirt is not worn. Braid is sewn round the bottom of it in two rows.

It should be remembered that some kinds of material shrink more than others, and that sea-water is disastrous to certain colours. It would not do to make the costume and then find it shrink; therefore, ample room should be left for movements of the body, especially when stretching full length, as one must do when swimming.

If the girl who is making this bathing-dress understands anything about dressmaking, she will know that if the material at the shoulder-line, marked A in picture 2, is slit, and sloped slightly down towards the arms, the gown will look more shapely than if it were left quite straight. One hardly expects a bathing-gown to fit well like a dress, of course, but, if we do not mind a little extra work, we shall find the little seams suggested a very great improvement indeed.

A LITTLE VEGETABLE GARDEN
WHAT TO DO IN THE MIDDLE OF AUGUST

ANOTHER seed-sowing season has come round again; indeed, as we have seen, there are few months from early spring to late autumn when we may not sow one thing or another. In August the most important crop to think about is the onion. The onions that were sown in the spring, and have been growing all through the summer, are by this time almost ready to lift and dry—much depends, of course, on the district and the date at which they were sown—for winter use. We can even use them for some time in the spring. Then the time comes when, of their own accord, they begin to sprout, and sometimes even to produce fresh roots; then, of course, they are of no more use for cooking. The seeds that we sow in the month of August are intended to produce a crop to follow these winter onions. We should choose a position that gets as much of the winter sunshine as possible, and the kind of onion to sow at this time is the Tripoli.

Another crop, the seed of which we may sow now, is the winter spinach; very often it is sown on the ground that has been occupied by the potatoes. It is important to sow thinly, and when the seedlings are well up, it is necessary to thin out the little plants until they stand six inches apart in the rows.

During this month many people also sow a row or two of turnips, so as to have young roots for use during the winter; but in small gardens we cannot grow everything, so we must make our choice, and decide which will be most acceptable in the kitchen.

But still we have not come to the end of the vegetable seeds we might sow, and mention may well be made of lettuces. The kind to select is known as the brown cos lettuce, as this is the most likely to stand the severity of the winter. It is never a very certain crop, and some people take the precaution of putting a cold frame over the plants when the sharp weather sets in. Others, again, let them take their chance, and more often than not, when the soil is not unusually heavy and cold, most of the plants are strong and healthy in the spring, and may then be planted out. These, of course, are a considerably earlier crop than those not sown until the spring.

If we are thinking of planting a strawberry bed, the soil must be made ready. We must dig it deep and put in some well-rotted manure, and after that it is as well to tread it. Half the secret of getting the plants to take quickly to the soil is to plant them firmly.

If the out-of-door tomatoes are ripening quickly now, we may pluck those that are ruddy, and finish ripening them in a sunny window, or, better still, in a greenhouse or conservatory, as near to the glass as we can get them. Of course, they must be partially coloured before we pick them. We must still keep a look-out for side growths, and remove them as soon as they appear. If the plants are bearing fruit very plentifully, it is well to feed with liquid manure well diluted with water. We need not give this every day, but only alternately with plain water.

Perhaps the patty-pan squashes are now showing fine large fruits, and we must remember that there is no need to let these remain on the plants after they have reached a fair size, as the plants will be all the better without them. Young immature squashes, freshly picked, are a great deal nicer to eat than those that have fully matured their seeds.

A FLORAL BAROMETER

ON another page we read how to make artificial flowers. We can turn the art to account in a practical fashion, and make a bouquet of paper flowers that will tell us what the weather is going to be. So let us make some flowers out of pink paper, and some others out of blue paper. Any kind of flowers will do, so long as we use these two colours. We can make either a big or a small bouquet.

Now we purchase from a druggist a few cents' worth of chloride of cobalt, and dissolve it in water. When it is dissolved, we dip the flowers into the solution we have made, then hang them up to dry. If the solution is weak, we may dip them in a few times, letting them dry before every repetition of the bath. That is all we need. The floral barometer is ready for its work. When the weather is going to be damp, the flowers made of pink paper will remain pink; but when it is going to be dry, they will change into a purple colour. Also, the flowers made from blue paper will remain blue when the weather is going to be wet, but when it is going to be dry they will turn to green. This floral barometer is fairly reliable, and is more reliable than many expensive instruments to foretell the weather.

The paper bouquet, when coated with the solution of chloride of cobalt, as we have described, becomes what is called by scientific men a *hygrometer*, which means measurer of moisture, and which comes from two Greek words—*hygros*, moist; and *metros*, a measure. A bit of seaweed fresh from the sea forms a very good hygrometer. This is crisp and dry in warm weather, and moist and clammy in wet weather. This is caused by the salt that remains on it; the salt takes in moisture from the air when the air is moist, and, when the air is dry, so is the seaweed and the salt. If our senses were keen enough we could tell when the air is moist or dry, but our senses are not nearly keen enough to detect little changes, and careful students of chemistry and of Nature have found out that the effect upon other objects, such as salt seaweed, is much greater than it is upon men and women and boys and girls, so that by studying seaweed and other things we can tell what changes the air is undergoing, and so can tell what kind of weather we are going to have.

THE NEXT THINGS TO MAKE AND THINGS TO DO ARE ON PAGE 4025

A FAMOUS STORY OF A GOOD MAN

IT is just a little over half a century since "John Halifax, Gentleman" was written, and, as it is still one of the most widely read of English stories, it certainly deserves to be included among the famous books written by English authors. Not that it is in every way a great story, for it is remarkably lacking in incident and movement. It depends entirely for its interest on the character of its hero, who is, in every sense, an example of true manliness, a Christian gentleman. The fact that its author can interest us in her hero with so quiet a story is all the more to her credit. "John Halifax, Gentleman" was written and published in 1857 by a lady named Dinah Maria Mulock, who was then thirty-one years of age, and who had earlier written several stories. Some years later she married a gentleman named Craik, and sometimes her married name is given on the title-page of this, the most famous of her books. Mrs. Craik died on October 12, 1837.

JOHN HALIFAX, GENTLEMAN

CONTINUED FROM 3809

"GET out o' Mr. Fletcher's road, you idle, lounging, little——"

"Vagabond" was no doubt what Sally Watkins, the old nurse of Phineas Fletcher, was going to say, but she had changed her mind in looking again at the lad, who, ragged, muddy, and miserable as he was, was yet anything but a "vagabond."

A downpour of rain had drawn Mr. Fletcher and his son Phineas to shelter in the covered alley that led to Sally's house, on their way home. Mr. Fletcher pushed the little hand-carriage in which his weak and ailing son was seated into the alley. The ragged boy, who had also been sheltering there, lent a hand in bringing Phineas out of the rain, Mr. Fletcher saying to him kindly, after Sally's outburst, "Thee need not go into the wet, my lad. Keep close to the wall, and there will be shelter enough both for us and thee."

Mr. Fletcher was a Quaker, as will be seen from his form of speech and his consideration for the poor boy. He was a wealthy tanner in the town of Norton Bury, and in every sense a good man, who, though prosperous in business, had suffered sorrow in his life. His wife had died, leaving him with their only child, Phineas, now a sickly boy of sixteen.

The ragged lad, who had seemed very grateful for the Quaker's kind words to him, stood leaning idly against the wall, looking at the rain that splashed on the pavement of the High Street. He was a boy perhaps of fourteen years; but, despite his serious and haggard face, he was tall and strongly built, with muscular limbs and square, broad shoulders, so that he looked a lad of seventeen or more. The puny boy in the hand-carriage, the child of a wealthy man, who had had all the care that money could secure, was filled with admiration for the manly bearing of the poor lad; for, in common with all people who are not physically strong, he admired anyone of manly appearance.

After some time the rain gave promise of ceasing, and Mr. Fletcher, pulling out his great silver watch, which had never been known to be wrong, said:

"Twenty-three minutes lost by this shower. Phineas, my son, how am I to get thee home? Unless thee wilt go with me to the tanyard——"

The boy in the hand-carriage shook his head, and his father then called out to Sally Watkins if she knew of anyone who would wheel him home. But at the moment old Sally did not hear, and the ragged boy then mustered courage to speak for the first time.

"Sir, I want work; may I earn a penny?" he said, taking off his tattered old cap and looking straight into Mr. Fletcher's face. The old man scanned the honest face of the lad very closely.

"What is thy name, lad?"

"John Halifax."

"Where dost thee come from?"

"Cornwall."

"Hast thee any parents living?"

The lad replied that he had not, and to many other questions with which Mr. Fletcher plied him he returned straightforward answers. The tanner promised him a groat if he would see Phineas safely home when the rain had ceased, and asked him if he would care to take the piece of silver now.

THE LITTLE GIRL WHO CUT A SLICE OF BREAD FOR POOR JOHN HALIFAX

"Not till I've earned it, sir," said the Cornish lad. So Mr. Fletcher slipped the money into his son's hand and left them. Only a few words were spoken between the two boys for a little while after he went away, and John Halifax stood idly looking across the narrow street at the mayor's house, with its steps and porticoes and its fourteen windows, one of which was open, showing a cluster of little heads within. The mayor's children seemed to be amused, watching the shivering shelterers in the alley; but presently a somewhat older child appeared among them, and then went away from the window quickly. Soon afterwards a front door was partly opened by someone whom another was endeavouring to restrain, as the boys on the other side of the street could hear loud words from behind the door.

"I will! I say I will——"

"You sha'n't, Miss Ursula!"

"But I will!" And there stood the little girl, with a loaf in one hand and a carving-knife in the other. She succeeded in cutting off a large slice.

"Take it, poor boy! You look so hungry," she said. "Do take it!" But the door was shut again upon a sharp cry of pain; the headstrong little girl had cut her wrist with the knife.

THE BEGINNING OF GOOD FORTUNE AND HAPPINESS FOR THE WANDERING BOY

After a little, John Halifax, who was clearly famished for want of food, went across the street and picked up the slice of bread which had fallen on the doorstep. In those days poor folk rarely tasted wheaten bread at all, and probably the Cornish lad had not eaten a morsel of it for months. He now ate the slice very slowly, and looked very thoughtful all the while. This was the beginning of all that made for happiness and good fortune in the life of John Halifax, as we shall discover in due time.

From the moment Phineas had set eyes on him he liked the lad, and as he lived a very lonely life, with no playfellows and no friends of his own age, he longed to be friends with this strong-looking, honest youth who had so suddenly come into his life. John had been so tender in the way he had helped Phineas home that the Quaker boy felt sure he would be a worthy friend.

It appeared that John had heard of his father as a sad, solemn sort of man, much given to reading. He had been described to John as "a scholar and a gentleman," and the lad had determined that he, too, would be a scholar and a gentleman. He was only an infant when his father died, and his mother, who had been left very poor, had a sore struggle until she died, when John was only eleven years old. Since then the lonely boy had been wandering about the country getting odd work to do at farms, and other times almost starving.

JOHN HALIFAX DETERMINES TO BE A GENTLEMAN LIKE HIS FATHER

Thus had he wandered to Norton Bury; and now, thanks to Phineas, Mr. Fletcher gave him a job at the tannery, although at first he was not altogether sure of John's character.

It was not long, however, before the two lads were fast friends, and spent much of their time together. John Halifax could read, but he had not yet learnt to write; so Phineas, who had been well educated, became his friendly tutor, and repaid his devotion by teaching him all he knew.

One day John took from his pocket a little case of leather, with an inner one of black silk, which enclosed a book. This was the one treasure he had carried about with him since his mother's death; and he would not let it go out of his hand, but held it so that Phineas could see the leaves. It was a Greek Testament, on the fly-leaf of which was written, after the old English fashion:

"Guy Halifax, his book.

"Guy Halifax, gentleman. Married Muriel Joyce, spinster, May 17, in the year of our Lord 1779.

"John Halifax, their son, born June 18, 1780."

There was one more entry, in a feeble, illiterate hand:

"Guy Halifax, died January 4, 1781."

Getting Phineas a pen, but never once letting go of the precious book, John asked him to make another entry on the same page:

"Muriel Halifax, died January 1, 1791."

That was all Phineas ever heard of the boy's parentage, nor did John know more about it himself. He was indebted to no forefathers for a family history; his pedigree began and ended with his own honest name—John Halifax. But his father had been a gentleman, and he, too, meant to be a gentleman.

John Halifax did not like the work he had to do at the tannery, where his days were passed among dirty and evil-smelling things; but, none the less, he did his duties faithfully, and never shirked a task. At times the desire rose in him to go away and try to find some better occupation; but when he read "The Pilgrim's Progress" he saw that the path of duty was never easy to follow, and so continued his labours in the tannery with a stout heart.

JOHN HALIFAX DOES HIS DUTY FAITHFULLY AND IS NOT WITHOUT REWARD

The result was that, as the years passed, and old Mr. Fletcher found him worthy of the highest trust, John came to be manager of the business, and to live in the house of his master. In knowledge, too, he had grown, for Phineas had been a good tutor, and John so apt a pupil that before long Phineas confessed he knew more than himself.

It was one day when they were having an open-air lesson on a hill above the River Avon that they saw a boat in distress, its occupants being in danger of drowning. John managed to effect their rescue; and one of them, Squire Brithwood, a haughty, conceited person, instead of thanking his rescuer, threw him a piece of money, which John threw back at him. The other, who seemed indignant at the way the squire had treated their rescuer, inquired of John who he was and what he did; but seemed disappointed on hearing that he was only a worker in Fletcher's tanyard.

"My name is March — Henry March," said the gentleman. "If you should ever——"

"Thank you, sir. Good-day!" was all that John would say, and so the matter ended.

It was some years after this that John and Phineas were spending the summer days at the rural village of Enderley, where they lived at Rose Cottage. Enderley was not far from Norton Bury, and every day John rode there to look after the tannery and the flour-mill which had recently been added to Mr. Fletcher's now flourishing business.

HAPPY SUMMER DAYS AT ROSE COTTAGE IN THE COUNTRY

Now, Rose Cottage was really two houses, in one of which the young men lived, while an invalid gentleman and his daughter were staying in the other. John Halifax had noted this young lady occasionally in his walks across the breezy downs which surrounded the place, and thought her the sweetest creature he had seen. When he got to know that her name was Ursula, he was thrilled with happy memories of the little girl who had thrown him the slice of bread, for he had heard her called by that same name, and wondered if this might be she grown into a young woman.

Ere long he came to know his pretty neighbour, and to be her companion in their rural walks. No artist ever painted a more attractive picture than these two made stepping briskly across the wind-swept uplands; she with her sparkling dark eyes, her great mass of brown curls escaping from her hood, and John with his frank, ruddy face, and his fine, swinging, manly figure.

WHY URSULA LEFT ROSE COTTAGE AND JOHN HALIFAX WAS SAD

Ursula's father, who had come here ailing, died at the cottage, and was buried in Enderley churchyard. He had been the same Henry March whose life John saved that day when the Avon was in flood. He was cousin to Squire Brithwood; and, unhappily, Ursula's fortune was left in the keeping of that haughty and unchristian person. The squire's wife, Lady Caroline, was a light-headed, senseless woman, as much talked about in Norton Bury for her foolish conduct as her husband was notorious for his drunkenness. Yet it was to the care of such as these that

Henry March had left his daughter, though he had intended to appoint another guardian to look after her.

John was very sad at the thought of Ursula leaving the cottage for the squire's home at Mythe House, for he knew that she had been happier there in the sweet country retreat than she would ever be in the ill-conducted household of her guardian. She, too, had regrets at the thought of going, as John and she had been such fast friends.

JOHN HALIFAX TELLS URSULA THAT HE IS ONLY A TANNER'S APPRENTICE

John told her that Mr. Brithwood would probably deny his right to be considered a friend of hers, and would not allow his claim to be thought a gentleman, even though a poor one. In answer to her expression of astonishment, he said :

"It is right, Miss March, that you should know who and what I am to whom you are giving the honour of your kindness. Perhaps you ought to have known before; but here at Enderley we seem to be equals—friends."

"I have indeed felt it so."

"Then you will the sooner pardon my not telling you—what you never asked, and I was only too ready to forget—that we are *not* equals—that is, society would not regard us as such, and I doubt if even you yourself would wish us to be friends."

"Why not ?"

"Because you are a gentlewoman, and I am a tradesman."

The news was evidently a shock to her. It could not but be, reared as she had been. She sat—the eyelashes dropping over her flushed cheeks—perfectly silent. John's voice grew firmer, prouder; there was no hesitation now.

THE LITTLE GIRL WHO GAVE JOHN HALIFAX BREAD WHEN HE WAS STARVING

"My calling is, as you will soon hear at Norton Bury, that of a tanner. I am apprentice to Abel Fletcher, Phineas's father."

"Mr. Fletcher !" She looked up at him, with a mingled look of kindliness and pain.

"Ay, Phineas is a little less beneath your notice than I am. He is rich, and has been well educated; I have had to educate myself. I came to Norton Bury six years ago—a beggar-boy. No, not quite so bad as that, for I never begged. I either worked or starved."

The earnestness, the passion of his tone, made Miss March lift her eyes, but they fell again.

"Yes, Phineas found me starving in an alley. We stood in the rain opposite the mayor's house. A little girl—you know her, Miss March—came to the door and threw out to me a bit of bread."

Now indeed she started.

"You ! Was that you ?"

"It was I !"

John paused, and his whole manner changed into softness as he resumed :

"I never forgot that little girl. Many a time, when I was inclined to do wrong, she kept me right—the remembrance of her sweet face and her kindness."

That face was pressed down against the sofa where she sat. Miss March was all but weeping.

John continued :

"I am glad to have met her again, and glad to have been able to do her some small good in return for the infinite good she once did me. I shall bid her farewell now, at once, and altogether."

A quick, involuntary turn of the hidden face seemed to ask him "Why ?"

THE ILLNESS OF JOHN HALIFAX AND A DREAM THAT CAME TRUE

"Because," John answered, "the world says we are not equals; and it would be neither for Miss March's honour nor mine did I try to force upon it the truth—which I may prove openly one day—that we *are* equals."

Miss March looked up at him—it were hard to say with what expression, of pleasure, of pride, or simple astonishment ; perhaps a mingling of all ; then her eyelids fell. She silently offered her hand, first to Phineas, and then to John. John pressed it, and rose. His hand was on the door, but he could not go.

"Miss March," he said, "perhaps I may never see you again—at least, never as now. Let me look once more at that wrist which was hurt."

Her left arm was hanging over the sofa, the scar being visible enough. John took the hand, and held it firmly.

"Poor little hand—blessed little hand ! May God bless it evermore !"

Suddenly he pressed his lips to the place where the wound had been, a kiss long and close, such as only a lover's

SCENES FROM JOHN HALIFAX, GENTLEMAN

John Halifax and his sweetheart Ursula, having determined to be married, came to old Mr. Fletcher, who had been so good a friend to them, and asked for his blessing.

Young Lord Ravenel, the son of the Earl of Luxmore, loved to sit and listen to Muriel, the blind but beautiful daughter of John Halifax, playing upon the organ.

One day a stranger came to the door, and for a moment he was coldly received, until he told Maud that he was her own brother Guy come back from America.

The end of John Halifax was as peaceful as his life had been. On the hillside, where he had been watching his young people, he fell into the sleep that knows no waking.

kiss could be. Surely she must have felt it—known it. A moment afterwards he was gone. That day Miss March departed, and John and Phineas remained at Enderley alone.

After John Halifax had returned to Norton Bury he was seized with fever, and for a time it looked as if he might not recover. In his delirium he called aloud for Ursula, and dreamed that she had come to sit with him, asking him to live for her sake. Phineas, in his anxiety for his friend, brought Ursula to him, and the dream came true, for she did ask him to live for her sake. He recovered at length, and became Mr. Fletcher's partner.

Going to London on behalf of the business, John there met the great statesman, Mr. Pitt, who was impressed with the natural abilities of the young man. His reputation for honesty and sound common-sense had now grown so great in Norton Bury, that when he returned there he found himself one of the most respected men in the town.

THE MARRIAGE OF JOHN AND URSULA AND THE FORTUNE DENIED THEM

Although he was still far from being rich, he was no longer a poor worker, and as Ursula was willing to share his life, they boldly determined to be married, in spite of her guardians, who asserted that John would never touch a penny of Ursula's fortune. They contrived, however, to be happy without it, for John refused to go to law to recover his wife's money, and was determined he would work honestly to support her. Lady Caroline would have been friends with them, but he wished to have nothing to do with her, or the class of people who were her associates.

With the death of old Mr. Fletcher, however, came misfortune, for it was found that the tannery was no longer a paying property, and there were only the mills to go on with. The temptation now was strong, in the face of his difficulties, for John to claim his wife's fortune, illegally held by Squire Brithwood. But he resisted it, and determined to struggle on.

At this time Ursula's relative, Lord Luxmore, who was anxious to see the Catholic Emancipation Bill passed, thought he could use John Halifax for his purpose by offering to get him returned to Parliament for the "rotten borough" of Kingswell, the member for which was then elected by only fifteen voters. Twelve of these were tenants of Lord Luxmore, and the other three of Phineas. But although John would have supported the Bill, he was too honest to let himself be elected to such a seat, as all honest men were then agitating to abolish these "rotten boroughs."

JOHN HALIFAX'S HONESTY IS PUT TO THE TEST AND FOUND TRUE

So he declined, and Luxmore next tried to win him over by offering him the lease of some important cloth-mills he owned; but these he would not take on credit, and he had no money to pay for them. So Ursula now determined to tell his lordship all about the way her fortune had been kept from them; and the result was that Lord Luxmore went to Brithwood and made him turn over the money to her. When John purchased the lease of the mills, his lordship thought he had secured him firmly, and that John would use his great and growing influence with the people of the district to further Luxmore's political schemes.

While all this was going on, young Lord Ravenel, the son and heir of Luxmore, had been a constant visitor at the Halifax home, and delighted in the company of John's daughter, Muriel. Halifax had now three children: two boys, named Guy and Edmund, and Muriel, who, alas! had been born blind. Perhaps on account of her infirmity she had been the pet of her parents; but she was of a gentle and affectionate nature, and was also beautiful to look upon, even with her sightless eyes. Young Ravenel was also a gentle youth, and, like Muriel, was fond of music.

THE INDEPENDENCE OF JOHN HALIFAX AND HOW HE MET OPPOSITION

The time for the election of the member for Kingswell had now come round, and as Luxmore had failed to induce John Halifax to stand, he put up another person, who would do just as his lordship wanted. But he was greatly mistaken in supposing that John would use his influence to make the handful of voters, most of whom were employed in his mills, vote for Luxmore's man. Instead of that, Halifax advised them to be honest, and vote as they thought right; with the result

that his lordship evicted them from their homes, as was often done before the reform of political voting. But John found new homes for them, and everything prospered with him.

As his riches increased, he bought a stately country mansion, named Beechwood, not far from Rose Cottage, which was ever dear in memory to him. Another son, Walter, was born to him, and everything seemed to smile on him in his beautiful country home.

DESPITE UNFRIENDLY OPPOSITION, JOHN HALIFAX GROWS IN PROSPERITY

Luxmore now sought to injure him by diverting the water from his cloth-mills, and leaving his great wheels idle. Of course, Halifax could have taken him to law; but, instead of that, he simply set up a steam-engine, which was then a great novelty; and his mills did better than ever.

Luxmore, finding it useless to fight against the resourceful Halifax, went abroad, and left his son, Lord Ravenel, alone at Luxmore Hall. The young man, despite his father's unfriendly conduct, was still a frequent visitor at Beechwood, and when poor Muriel died, his grief at her loss was only less than that of her parents.

The years passed by, and happiness still reigned at Beechwood; but little had been seen of Ravenel, until one day John Halifax met him, greatly changed from the gentle youth of the past, at Norton Bury. John invited him to ride over with him to Enderley.

"Enderley? How strange the word sounds! Yet I should like to see the place again," said Ravenel, who decided to accompany John Halifax and Phineas Fletcher in the drive back to Beechwood. It was a cold and bitter night in early winter, and Ravenel wrapped himself closely in his furs as they drove along the turnpike road.

THE ATTACK IN THE NIGHT, AND HOW JOHN HALIFAX ACTED

He inquired kindly for all the family, and was told that Guy and Walter were as tall as himself, while the daughter——

"Your daughter?" said his lordship, with a start. "Oh, yes; I recollect—Baby Maud. Is she at all like—like——"

"No," said John Halifax. Neither said more than this; but it seemed as if their hearts warmed to one another, knitted by the same tender remembrance.

At an unfrequented part of the road the carriage was set upon by a number of men, who, seizing the horses, shouted out that they wanted money. The times were hard, and these were some of the unemployed fellows of the countryside, who, in desperation and folly, thus sought to extort money from the wealthy John Halifax. But the master of Beechwood showed Lord Ravenel how firmness and gentleness could win the hearts even of one's enemies.

The horses, plunging and rearing in the darkness, knocked down one of the men, and while Ravenel would have had Halifax whip ahead at this moment, John, quieting the horses, leapt down to the ground, and lifted the man up with the assistance of some of his fellows. Examining his injuries by the light of the carriage lights, he found, to his sorrow, that he had been killed. The other men were so amazed by this act, and especially when Halifax had the dead man wrapped in one of the rugs from the carriage and insisted on going with him to his home, that they all felt guilty for their unwarranted assault on the unoffending mill-owner.

LORD RAVENEL'S PROPOSAL AND SOME GOOD ADVICE TO THE YOUNG LORD

John Halifax, on his part, promised to do all he could to help them, and thus not only taught them a lesson in good conduct, but proved to Lord Ravenel that the "lower orders," even in their misguided folly, were worthy of something better than being ridden down by rich men's carriages.

Lord Ravenel had now returned to reside again at Luxmore Hall, and his visits to Beechwood became as regular as they had been in the old days at the Halifax home, when Muriel was alive. It was the society of Maud in which his lordship now delighted, though he never forgot the serene and happy days he had spent with her blind sister, who was no more.

Not altogether to the liking of Mr. and Mrs. Halifax was it discovered that their second son, Edwin, was in love with Miss Silver, the governess; but John Halifax was not the man to allow any false feeling of pride to stand in the way of his son's happiness, and so the old Norton Bury house was given to Edwin and his bride, for them to begin

housekeeping where John and Ursula had begun before them.

Soon after this, Lord Ravenel sought to be regarded as suitor for the hand of Maud, who would thus have become the future Countess of Luxmore. He said that he would wait two years for her, if her father wished it; but John Halifax would make him no promise, and urged him rather to endeavour first to become a more worthy man, so that he might do something to redeem the evil reputation which the conduct of his own father had brought upon the name of Luxmore.

"Do you recognise what you were born to be?" said Halifax to him. "Not only a nobleman, but a gentleman; not only a gentleman, but a man—man made in the image of God. Would to Heaven that any poor word of mine could make you feel all that you are—and all that you might be!"

THE YEARS PASS BY AND THERE IS HAPPY NEWS OF GUY HALIFAX

"You mean, Mr. Halifax, what I might have been—now it is too late."

"There is no such word as 'too late' in the wide world—nay, not in the universe," said John Halifax.

Lord Ravenel for a time sat silent; then with a sudden effort he rose to go, and, thanking Mrs. Halifax for all her kindness, he said, in a voice choked with emotion:

"For your husband, I owe him more than kindness, as perhaps I may prove some day; if not, try to believe the best of me you can. Good-bye!"

It was not many weeks after this that the old Earl of Luxmore died in France, and it then became known that his son, who now succeeded to the title, had voluntarily given up his claims on the estate in order to pay the heavy debts of his worthless father.

The home at Beechwood had lost another inmate, when Guy, first going to Paris, had later sailed for America. Years passed by, and he became a successful merchant in Boston, and then one day he wrote home to say he was coming back to the Old Country to be with his father and mother again, and was bringing with him the partner in his business.

The ship in which Guy and his friend sailed from America was wrecked, and Ursula, in her grief at the supposed loss of her eldest son, seemed to be wearing away, when one day a strange gentleman stood in the doorway—tall, brown, and bearded—and asked to see Miss Halifax. Maud just glanced at him, then rose, and said somewhat coldly:

"Will you be seated?"

"Maud, don't you know me? Where is my mother?"

The return of the son whom she had given up for dead brought joy again to the heart of Ursula, and her health seemed to revive, but it was clear that her days were now uncertain.

YOUNG LORD RAVENEL PROVES THAT JOHN HALIFAX WAS RIGHT

Scarcely less than the delight in Guy's return was the discovery that his partner was none other than the new Earl of Luxmore, who, as plain Mr. William Ravenel, had by his life in America proved John Halifax was right when he said it was not too late for him to model his life on lines of true manliness. He had, indeed, become all that John had desired of him—a man and a gentleman—so that Maud was, after all, to be the Countess of Luxmore.

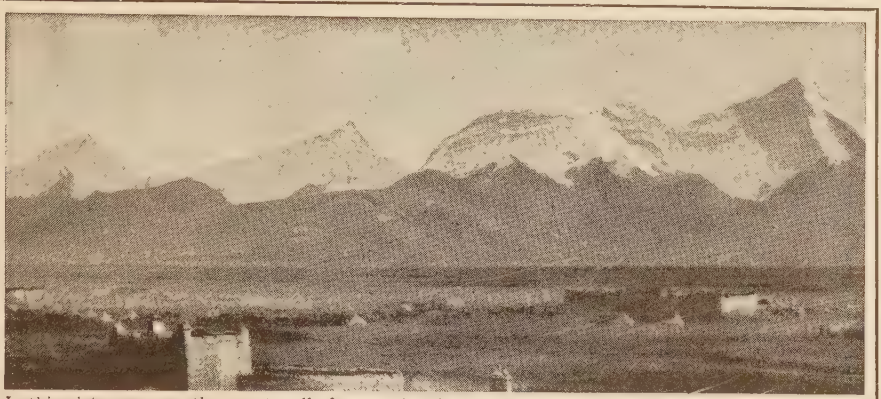
But the days of John Halifax himself were now drawing to a close, and he was not without premonitions of his end; for in his talks with Phineas Fletcher, who had remained his faithful companion all these years, he spoke as one would speak of a new abode, an impending journey. Death came to him very gently one day at sunset, just after he had smiled to Phineas, when his old friend, looking towards Lord Luxmore and his future bride, who were with a group of the young people, had said:

"I think sometimes, John, that William and Maud will be the happiest of all the children."

THE PEACEFUL END OF A NOBLE AND BEAUTIFUL LIFE

He smiled at this, and a little later seemed to be asleep; but when Maud came up and spoke to him, he was dead. While he was sleeping thus, the Master had called him. His sudden end was so great a shock to the frail life of Ursula, that when they buried John Halifax in the pretty Enderley churchyard they laid to rest with him his wife of three-and-thirty years, who had been a widow but for a few hours.

The next Famous Books are on page 4017.



In this picture we see the great wall of mountains that encloses the land of Tibet and has acted as a barrier against invasion for centuries. It is the difficulty of getting into the country, owing to the natural barriers of mountains and deserts, that makes Tibet still the least-known country in the world.

THE HEART OF ASIA

TIBET, TURKESTAN, MONGOLIA, & AFGHANISTAN

CONTINUED FROM 3882

IN the stories of the countries of Europe we often read of the waves of settlers and hordes of conquerors rolling westwards from the heart of Asia. Adventurous explorers have ever been drawn, as with a magnet, to search out the secrets locked up in this great and wonderful heart of Asia, as large as the whole of Europe; but, for the most part, the vast lands, which have sent forth teeming millions to fashion the face of Europe, lie silent in inexpressible grandeur and loneliness.

In Europe more than 400 millions of people live and work, and call for food from near and far; but there is a population of only about 21 millions in that part of Asia lying between Siberia and India on the north and south, and Persia and China on the east and west. By far the greater number of these 21 millions make their homes in tents, and wander about in search of fresh pasture for the immense flocks and herds that they rear on the steppes; others till the soil of the fertile valleys and oases that are made to smile by the life-giving waters of the rivers. The chief point in Central Asia is the "Roof of the World"—the Pamir Plateau—north of the great bend which the Indus makes when it breaks through the Himalaya Mountains. The treeless and rocky valleys of this tableland, covered with snow for many months of the year, equal in height the highest mountains in Switzerland, being about three miles above the level of the sea. The mountains that cross it and surge around it rise a mile or more higher still. To understand the connection of this well-named "Roof of the World" with the immense ranges that meet upon it, we must study a relief map of Asia, or make one in the way described on page 3821.

From the south-west corner of the plateau spring the mighty heights of the Himalayas, the abode of snow, extending for nearly 2,000 miles eastwards above the plains of India. The majestic range of Kwen Lun, with the loftiest passes in the world, runs eastward from the south-east corner of the Pamirs. From the north of the plateau the great Thian Shan range—the "Mountains of Heaven"—runs eastward for a distance as far as from London to St. Petersburg, towards the Mongolian

plateau, which in turn is crossed by the Altai Mountains, south of Siberia. From the south-west of the Pamir Plateau the ranges of the Hindu Kush cross Afghanistan. These, and the western outlying mountains of the Pamirs, run on to form the northern boundary of the Persian desert, and join the Elburz Mountains south of the Caspian Sea. Many shorter ranges, such as the Karakorum—whose greatest heights are known to tower above the Himalayas—and the Sulaiman, gather like buttresses round the "Roof of the World."

THE WHITE MOUNTAIN PEAKS THAT LOOK DOWN UPON CENTRAL ASIA

If we could but look down from above on these giant mountain walls—the framework of Central Asia—what a scene of extraordinary beauty and desolation would meet our eyes! Nearest us would be the dazzling white of the snowy peaks, for most of the mountains of Central Asia are far above the line of perpetual snow, surrounded by glaciers and ice-fields, all of immense size. In contrast with all this would be the dark, bare pinnacles of rock, the fearsome precipices and cliffs, girdled lower down by dark forests and rushing streams. From these, grassy slopes stretch downwards, covered with lighter vegetation, and relieved in places with masses of crimson rhododendrons and other Alpine flowers.

Between these mountain walls, which act as barriers to the moisture in the air, to plants and animals, and to races of men, lie the countries that make up Central Asia. For the greater part these countries can be filled in, in our broad picture, with a tone of brownish yellow, relieved here and there by splashes and long streaks of green. This vivid green vegetation often connects the dark green foliage of the mountain forests and the grassy slopes with the vast extent of yellow desert below.

THE LITTLE KNOWN LAND STANDING THREE MILES ABOVE THE SEA-LEVEL

Let us now find these countries upon the map. On the east of the Pamirs is the high tableland of Tibet, between the Himalayas and the Kwen Lun Mountains. Tibet is eleven times as large as England and Wales, and most of its surface, like the Pamir Plateau, is three miles above the level of the sea, with many peaks rising higher still. Eastern Turkestan, more than twice the size of Germany, lies between the Kwen Lun and the Thian Shan Mountains; a great deal of it is in the basin of the Tarim River, shut in by immense deserts.

The vast upland of Mongolia, of about the same area as Arabia, lies beyond the Thian Shan Mountains, and is bounded by Siberia and Manchuria. All these three countries of Central Asia have long been practically part of the vast Empire of China.

It is Afghanistan and British India that are chiefly concerned in the important passes to the south-west of the central plateau in the Hindu Kush and Sulaiman ranges. The fourth of the Powers whose dominions meet on the Pamirs is Russia. Two great rivers, the Syr Daria and the Amu Daria—Daria is the Persian word for river—flow from the heights of the Thian Shan and the Pamirs over the plain of Western Turkestan to the inland sea of Aral. Russian Central Asia stretches over these valleys from the Pamirs to Siberia, from the Caspian to the borders of Eastern Turkestan, nearly one-half the area of the United States.

WANDERING TRIBES & FERTILE VALLEYS IN THE GREAT DESERTS OF ASIA

We read in the story of Russia that begins on page 3745 how much of this vast country is desert, and how much consists of grassy steppes on which wandering tribes, such as the Kirghiz and Turcomans, raise immense flocks and herds. We may at the same time glance at the fertile oases and river valleys, with their fine crops of fruit, vegetables, grain, and cotton for the mills of Moscow and Warsaw. In parts of West Turkestan coal is found to be abundant, and it will be of great use as fuel for the railways and river and lake steamers of the district if ever the supply of petroleum refuse from Baku, which is now used, should fail.

Russian enterprise has brought the railway from the Caspian to the foot of the Thian Shan Mountains, linking together the towns situated on the oases and in the fertile valleys. One likes to think what the impetuous Tamerlane, who made his headquarters at Samarkand, would have thought of this rapid means of transit. A branch line is being made from Merv, the last

stronghold of the warlike Turcoman tribes, subdued by Russia in the middle of the last century, towards the Afghan frontier near Herat, to meet, in course of time, the British railway that is being made from India through the Bolan Pass, of which there is a picture on page 1703.

Thus, far into the heart of Asia, the shriek and snort of the "iron horse" wakes the solitude and opens up possibilities of trade and travel on very

MAP OF CENTRAL ASIA, SHOWING AFGHANISTAN, TIBET, TURKESTAN, AND PART OF MONGOLIA

different lines from those of old, which we can still study in Chinese Central Asia. The caravans of camels and ponies and asses, laden with goods, passing from one boundary to another, still toil over ancient routes from oasis to oasis, across deserts, by difficult mountain passes; and the intrepid explorers, to whom we owe most of our knowledge of this part of the world, make up their own caravans, taking their own provisions, boats, tents, maps—in fact, everything they need—along with them. It is very easy to perish of hunger and thirst in these parts of Central Asia.

Let us start our travels in Mongolia, the vast grassy uplands lying between China and Siberia, and girdled by snow-topped mountains, whose lower slopes are covered by forests. The great Desert of Gobi, treeless and waterless, about 2,000 miles long, lies in its midst; and in the north-west the off-shoots of the Altai Mountains give rise to many rivers that make fertile valleys. The greater number of the people of Mongolia are shepherds, tending their great flocks and herds as their ancestors have done from time immemorial, and living much the same life that they have done through the centuries. But the Mongols have ever been irresistible warriors, too, as well as shepherds, when occasion and great leaders arose.

It was a branch of these people, called the Huns, who came galloping from the south of Lake Baikal, round which the Siberian railway now circles, along the "Land of Grass," which stretches from the banks of the Amur to those of the Volga. We know how they horrified the dwellers in Europe, till their leader, Attila, was turned back at Châlons, not far from the Atlantic, in the middle of the fifth century.

Another branch of the Mongols, the Turks, who were settled near the rich metal-bearing Altai range, became for a time very powerful in Central Asia; and they, too, moved westward along

the "Land of Grass," a few centuries after Attila. We know how strongly they influenced the history of Western Asia and of Europe. We also know how soon the Turks adopted Mohammedanism when they came in contact with it. This religion, simple and direct when it was first taught, has ever appealed strongly to the wandering tribes of Central Asia, most of whom, to this day, observe its customs, and devoutly say their prayers facing towards Mecca.

All through the early centuries advances were constantly made on Central Asia by the neighbouring and ancient Empire of China, partly owing to the rise of trade, and partly through wars, in which sometimes the Mongols had the best of it and sometimes the Chinese.

When Jenghiz Khan, the "Perfect Warrior," arose early in the thirteenth century to lead his Mongols, he conquered not only the rest of Central Asia, but Persia and China too, though it was not till a century later that Mongol emperors were firmly established in China, where they ruled for a period of 200 years. After this the Mongols were driven out of China, and Mongolia then became a Chinese province.

THE CONQUERING HORDES OF TARTAR WARRIORS THAT SWEPT ACROSS ASIA

In the story of Russia we may read of the arrival of the Golden Horde of Mongolian Tartars, on the north of the Black Sea, also of the arrival of succeeding hordes as the years went on, and of how strongly their influence stamped itself on the country for 300 years. This influence is felt to this day. We know, too, how Timur, or Tamerlane, burst with his destroying armies over Persia and India, and then far away to Asia Minor, where he arrested for a time the power of the Ottoman Turks. The story of the great Mogul power in India, in the days of the Tudors and Stuarts, is told on page 1702.

At the same time that these fierce Mongols were setting fire to all the world within their reach, and in many cases retracing their steps after two or three hundred years towards their original home, the old life on the steppes and the deserts was still going on. The patient camels were plodding along the old trade routes, with but temporary hindrance, carrying the silk from China, the precious jade stone from South Turkestan, the beautiful carpets, and soft hangings, and all the other treasures and riches of the East which made it seem a perfect wonderland to Western minds.

But the Westerns, as we shall see later, for many hundreds of years had no chance of travelling and exploring in the wide regions of Central Asia, as these regions fell more completely under the power of the Chinese Empire.

A MIGHTY RIVER THAT HAS NO MOUTH AND NEVER REACHES THE SEA

The two important towns of Kashgar and Yarkand, on the trade routes from China to India and Russia, lie at the western end of Eastern or Chinese Turkestan, where the streams come down from the heights of the Pamirs and make some cultivation possible in this wide and desert country.

The great Swedish explorer, Sven Hedin, has spent much time in Chinese Turkestan, and to him we owe nearly all that is certainly known of the great River Tarim and its tributaries. Making his way over the outlying mountains of the Pamirs from the railway terminus of the Trans-Caspian line, he arrived at Kashgar while a great fair was going on. He soon pushed on to a town on the upper part of the river, and, after collecting native boatmen and stores and adapting a sort of house-boat, he started on his wonderful journey on the Tarim, a river as long as the Danube. Unlike the Danube and other rivers, the Tarim has no mouth and never reaches the sea, but dwindles away, after a long and winding course across a vast expanse of thirsty sand, in a system of shallow lakes.

A FAMOUS EXPLORER'S LONG JOURNEY ON AN ALMOST UNKNOWN RIVER

Sven Hedin spent three months in his house-boat, drifting, paddling, and sailing, making observations and mapping out the winding course, as he noted the surrounding country. On the banks of the river and its tributaries was every variety of scenery. Women and children waded out to bring melons and other food for his use from villages amid cultivated fields; groves of trees delighted his eyes, some like enchanted forests with the gorgeous red and gold of the autumn leaves, the stillness being sometimes

FAMOUS CITIES IN THE HEART OF ASIA

A few years ago no such photograph as this existed, for Lhasa, which is shown in the picture, was the unknown, mysterious city of Tibet that no European was allowed to approach. Its name means the Home of the Gods, and it is at Lhasa that the Dalai Lama, or high priest of Buddhism, lives. A British expedition entered Lhasa in 1904.

Samarkand, which is in Russian Central Asia, existed before the time of Alexander the Great, who captured it during his conquering journeys. In 1369 it became the capital of another great world-conqueror, Tamerlane, or Timur, who ruled his empire from Samarkand. The green stone used by him as a throne is still in the city.

Kabul, the capital of Afghanistan, stands 6,000 feet above the level of the sea. It has a considerable trade in carpets and shawls and silk goods, and the district round is noted for its fruit plantations. It was from Kabul that Lord Roberts set out in 1880 on his historic march to Kandahar, where he defeated the Afghans.

broken by the flight of the wild ducks and geese on their way to winter quarters. Then came long stretches of pasture land, where lonely shepherds watched their flocks and fled terrified at the sight of the strange-looking tent-boat. It was the explorer's turn to be terrified when the green eyes of the tigers that came down to the river to drink, lapping like our tame cats, gleamed out of the darkness, and the tall reeds rustled and whistled in the breeze.

A RIVER THAT RUNS IN A DESERT BETWEEN HIGH CLIFFS OF SAND

All this time the sand that lay for an immeasurable distance on both sides, beyond the streak of cultivation brought by the river, was out of sight. Presently, however, it pressed forward and formed high banks like cliffs, between which the boat glided on her journey in dreary stillness.

The ice stopped the boat at last, for when the river froze, the explorer had to start on the equally exciting and more dangerous part of his journey by land. Then came the loading of camels with food, firewood and other necessaries, and choosing of horses and asses and dogs, with the help of the natives who acted as guides and companions. Day after day they wound their way for nearly 200 miles across the desert. Sand-storms, difficult climbing over the loose sand-hills, piercing cold that froze the ink in the explorer's pen, scarcity of provisions—all fell to their lot.

But many interesting facts were discovered or verified, such as the shifting of lake and river beds, the former existence of forests where nothing now grows, and, most wonderful of all, the explorer discovered that great cities once flourished in this dry, silent waste, their remains being buried under the penetrating, ever drifting and shifting masses of sand that cover everything.

THE JOURNEY OF A LITTLE ENGLISH BOAT OVER THE DESERT LAKES OF ASIA

We long to linger with Sven Hedin in his adventures among the wonderful lakes in the Lob Nor district where the Tarim is finally lost. He reached this district when the spring had brought scorching heat and mosquitoes—very hard to bear in the desert solitudes. With a little canvas boat from England he paddled over the wide lakes, some gleaming with fish and wild swans, some intensely salt and still, and bearing no sign of life whatever. But we must hurry on to cross the high passes of the north mountain wall of Tibet, some 2,000 feet higher than the tops of the highest mountains of Switzerland. Here we feel intense cold, as well as tremendously high winds, blinding snow-storms, and terribly rough paths. But the grand precipices and giant peaks are a fitting match for the southern rampart of Tibet—the glorious Himalayas.

The great Indian rivers, the Indus and the Brahmaputra, rise close together in the southern valleys of Tibet, and then flowing on, one west and the other east, break through the Himalayas in grand gorges more than a thousand miles apart on their southwards search for the sea. The most fertile part of Tibet is in the upper part of these rivers, and of others that flow eastwards to China. On the wind-swept, high plateau, dotted with lakes, the people rear vast herds of sheep and mountain goats, and yaks carry the burdens over the difficult and dangerous mountain passes.

A LAND THAT IS GUARDED BY GLITTERING RAMPARTS IN THE CLOUDS

Tibet is one of the most extraordinary countries in the world, and its history and present state is chiefly owing to its position, that of a citadel strongly guarded by glittering, icy ramparts in the clouds.

For a long time Tibet was little affected by the wars and migrations and changes that went on in the rest of Central Asia. From hunters its early people developed into herdsmen, with yaks to carry their loads as they wandered about. Later they began to cultivate the soil where rivers made it possible, and as they became more civilised their power grew so much that they became formidable enemies even to China.

In the meantime a wonderful invasion was taking place in Tibet, and, indeed, it is the only one that has really mattered in the country's story. That ancient and wonderful religion of India, Buddhism, spread by slow degrees over Tibet, and in the course of time, as its influence lessened in India, it increased in Tibet, till at last that isolated and mysterious country, of which the outer world has always known so little,

MOUNTAIN AND PLAIN IN CENTRAL ASIA

The land of Tibet is about one-fourth the size of the United States, is enclosed by the loftiest mountains in the world, and is itself, higher up than any other country of its size. It consists of great tablelands, and the average height of the whole country is said to be as great as Mont Blanc. This dizzy gorge is typical of Tibetan scenery.

Away from the mountains, the heart of Asia consists of vast deserts, cut up by rivers, and dotted with lakes that seem to be disappearing as the deserts extend. This picture shows the kind of canoes the people use.

Reproduced, by permission, from Dr. Sven Hedin's "Scientific Results of a Journey in Central Asia."

became its chief headquarters. Naturally, Tibet shared to some extent in the convulsions that shook the old empire to which it was eventually attached; but, outside, worldly matters seemed to pass unheeded by the Tibetans as they became more and more absorbed in their religion and its observances.

How the British entered Lhasa, the mysterious capital of Tibet

Many travellers have of late years been turned back from its borders, for the Tibetans share the Chinese dislike of foreigners. However, a British force, sent to settle some trade arrangements, succeeded in entering Lhasa, the capital, which is only 150 miles from the Himalayas. But the chief high priest, or pope, the Dalai Lama, had fled. This man rules over his docile subjects as king and god; there is no limit to his power over them. China sends two governors to look after the state and its worldly matters.

Thousands of Buddhist pilgrims from China and India wend their way to worship at the holy city of Lhasa, and to reverence the Dalai Lama. He lives a short way from Lhasa, in a mysterious and huge white palace on the crest of a hill, the centre part a blaze of crimson, the roofs of glittering gold. Who can tell of the treasures inside, brought by the devout pilgrims from the rich East?

It is said that in Tibet there are 20,000 priests, or monks; in one monastery alone, near Lhasa, there are 6,000. Every family dedicates at least one son to the priesthood. This being the case, it is scarcely to be wondered at that the spirit of devotion to the religion of Buddha has very deeply influenced the Tibetan people, who have so little intercourse with the outside world, that holds such different opinions from their own.

A land of many prayers where men worship by machinery

Religious inscriptions are seen on the rocks, houses, and temples; prayer-wheels, such as those to be seen in the Room of Religions in the British Museum, turned not only by hand, but by wind and water, reel off prayers to the Deity amid the flutter of praying-flags. When the day is ending, and the dark rocks stand out grim against the sky, all work stops, the people gather in the squares and open places, and, prostrating themselves on the earth, chant the evening prayers. Very different has been the story of Afghanistan, on the other side of the Pamirs. Through the Khaibar Pass, thirty-three miles long, and in parts only ten to seventy feet wide, most conquerors have marched to the rich plains of India, and many have been the fights and struggles about other passes and the chief towns—all keys to India—as well as stations on the old caravan routes to French Indo-China and Persia.

Afghanistan has had its share in all the devastations and conquests of the centuries, for Arabs and Turks and Mongols have swept across it in turn. For a time, as we know, it ruled both in Persia and India; then its power ebbed again, but the hardy mountaineers became independent once more in the middle of the eighteenth century.

The British have bitter memories connected with many of the towns and passes. In 1842, a British army of 14,500 men left Kabul to retreat to India through the snowy passes which it commands. One man alone survived the constant attacks of the Afghans and the hardships of the way, and stumbled into Jellalabad on his exhausted pony, fainting, and hardly able to tell of the disaster and the fate of his companions.

The famous march of Lord Roberts from Kabul to Kandahar

In August, 1880, Lord Roberts made his famous march in twenty-two days from Kabul to Kandahar to restore order after the risings and losses following the settlement of the frontier boundaries.

If we turn to page 54, we can read the story of Marco Polo, the Venetian boy of fifteen, who walked to China in the thirteenth century. He was twenty-one when he reached the end of his journey. It will interest us to trace his route, for we, too, have crossed Syria to Mesopotamia and Baghdad, and found our way to the Persian Gulf. We have wandered, too, round the mountains and deserts of Central Asia. After a stay at Ormuz, finding it impossible to go on by sea, the boy, with his father and uncle, went north through Persia and Afghanistan.

Here the party had to rest awhile on account of Marco's illness; he greatly enjoyed the fine mountain air and scent of the pine-groves as he was getting better. Then, by the upper courses of the Amu Daria, formerly called the

THE PEOPLE WHO LIVE IN CENTRAL ASIA

The present inhabitants of Mongolia are wanderers, like their ancient ancestors. Here we see a wealthy Mongol gentleman.

These are Sarts of Russian Central Asia. The word Sarts is used for the settled people, agriculturists and traders, as distinct from the nomads, or wanderers.

A rich Turcoman of Bokhara, where wealth consists principally of sheep, goats, and camels. The Turcomans used to be brigands.

The Afghans are a fierce warrior race who dislike living within the walls of towns.

The Beloochis are a tall, daring race, although lazy, and they are much given to brigandage. They almost always go about well armed

This is a native soldier of Tibet, armed with a curious flint-lock gun common in the country.

These girls are Kalmucks of Russian Central Asia, a Mongolian race of nomads, or wanderers, found also in considerable numbers in the Chinese Empire

Here we see a Dervish of Samarkand, the once famous capital of the conqueror Tamerlane, who is buried there.

Women wrestling in the Tartar tribes living in Russian Central Asia. This race came originally from Chinese Tartary, and were formerly great conquerors.

Oxus, the party pushed up to the Pamir Plateau itself, and then descended on Kashgar, Yarkand, and Khotan. The Tarim basin was next crossed to Lob Nor. Finally, by the route to the north of China, the city of Peking was reached at last. These regions were closed to foreigners soon after this wonderful journey, and they were not described again by Europeans until six hundred years had elapsed.

We have found much to think over while looking at the map of the heart of Asia, and while following the footsteps of the brave travellers who have faced its mysteries and dangers in order to show its wonders to their fellow-men.

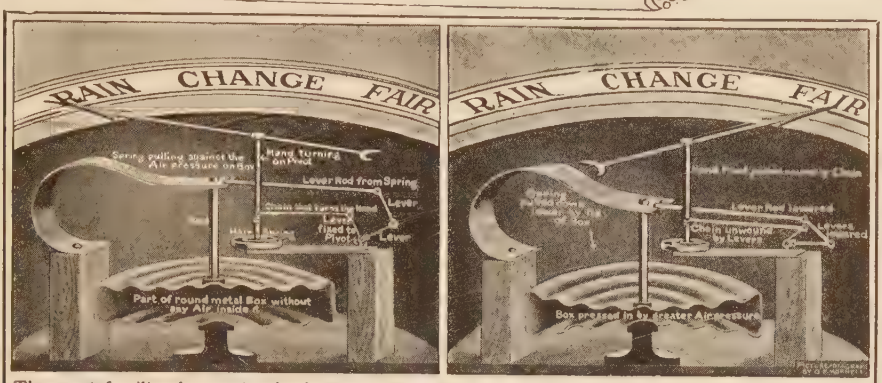
This strange scene is to be witnessed at the beginning of spring all over the land of Tibet. The country is full of monasteries, and at the great religious festival of spring the lamas, or monks, wear strange and hideous masks, in striking contrast to their gorgeous silk robes. The monastery shown in this picture is the famous one at Himis.

We have realised, too, whence came the streams of conquerors into Europe—the conquerors whose names and deeds and personal appearance are familiar to us. And yet there are many questions we should like to ask.

What of that dim host that, in the distant past, spread over India and Europe and left traces of their ways of life, and of their thoughts, in words that have been handed down through countless generations? Where was their first home, and why did they leave it? No one yet knows fully the answer to this question, though explorers and lovers of the study of Mother Earth's secrets, and of the languages spoken by her children, are all helping to find it. They say that perhaps, once upon a time, a great and restless open sea glittered in the sunshine, or raged in stormy might where the vast plains of Siberia now lie in swamps, slowly draining, with great salt inland lakes, such as the Caspian and Aral, that were left behind when the rising land pushed the ocean ever farther and farther north. The woolly mammoths imprisoned in the ice tell of mighty and overwhelming changes such as these. So, perhaps, what is now the dry and sandy heart of Asia was once a forest-covered seaside land, tempered by refreshing breezes that brought rain and moisture to a country that was not nearly so high as the "Roof of the World" is now. For when the bed of the northern ocean rose, the mountains and plateaus may have been pushed up, too, so that river basins and courses were completely altered, and the climate, instead of being pleasant and temperate, became one of great extremes in heat and cold.

Perhaps it was changes such as these that may have driven the early peoples of what is now Central Asia to the plains of India, and ever farther across Eurasia towards the lands of the setting sun.

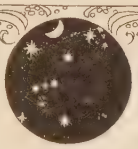
The next story of Countries is on page 4035.


RAIN CHANGE FAIR
Spring pulling against the Air pressure on Box
Hand turning on Pivot
Lever Rod from Spring
Lever
Lever fixed to Pivot
Part of round metal Box without any Air inside it
RAIN CHANGE FAIR
Lever Rod lowered
Box pressed in by greater Air pressure

The most familiar barometer is the aneroid barometer. The first picture shows its various parts and the second shows how these work. The air presses down with greater or less force upon the metal box, from which all the air has been exhausted, and this moves the hand, or indicator.

THE PRESSURE OF THE AIR

CONTINUED FROM 3840



WE are all aware that there are many different kinds of pressure. For instance, we realise what it is to press with the finger against anything, and whenever we use the word pressure, that is the kind of idea we may have in our minds. When we hold anything in the hand, we feel its pressure due to gravitation; and that is a kind of pressure which we know well, and which applies equally to all the different states of matter: solid, liquid, and gaseous. We also know that there is another kind of pressure exerted by rays, or radiation, in the ether, such as light, which is therefore called radiation pressure. We mention this kind of pressure because the discovery of it bears so greatly upon our ideas as to what must be the consequences of gravitation some day.

We must now pass on to the consideration of some other kinds of pressure, and we shall see that here we have again to learn of measurement. Just as we had special means for measuring gravity and specific gravity, and so forth, so special means have been invented for measuring the kinds of pressure we are about to discuss.

We speak of matter as either solid or liquid or gaseous; but of these three states in which we may find matter, two are much more like each other than either is like the third. Water is very different from the air above it; but there is one very important respect in which the water and the air are far more like each other than either of them is like the solid ground, and that is that they will both of them run, or flow.

In the solid ground there are forces holding together the molecules, so that the shape of the whole is maintained; but the shape of the air or water—if we can speak of such a thing—changes from moment to moment if it is allowed to, because both air and water flow. So liquids and gases are known in the language of science as fluids, which simply means things that flow. In ordinary language, liquid and fluid mean the same thing; but the point for us to understand is that gases also have to be reckoned as fluids, because, like liquids, they flow.

Now, in any fluid, at any time, and at any place, there is a certain pressure which is called fluid pressure, and there is at least one instance of fluid pressure which we have all measured many times, though perhaps we did not know that we were doing so. That is the pressure of the air.

This atmospheric pressure, as it is usually called, is by far the most important kind of fluid pressure

for our lives; and we must spend a little time in studying it carefully. We know that we really live at the bottom of a great ocean of air. On the floor of this ocean we live and crawl about, and if we can swim in it for a little while at a small height—as we do in flying machines—we are very proud of ourselves.

HOW THE AIR PRESSES INTO OUR LUNGS AND ENABLES US TO LIVE

Everywhere in this immense ocean there is fluid pressure. Perhaps the first and most important consequence of this fluid pressure is that it enables us to breathe. What happens when we breathe is that we make a movement which tends to empty the space in our lungs of everything; but as that space is in communication with the outer air, the atmospheric pressure drives some of that outer air into the space we make. Thus, without the atmospheric pressure we could not breathe, and, therefore, could not live.

Now, it is only some three hundred years ago since, in studying a case like this, men said that the reason why air or anything else would rush into an empty space, if it could, was that Nature objected to anything being empty. The phrase which they used, and which they accepted as an explanation, was *Nature abhors a vacuum*—vacuum being simply the Latin for an empty place. But, just about three centuries ago, it was discovered why Nature abhors a vacuum, and also to what extent Nature abhors a vacuum. It was found that what really happens is always the consequence of fluid pressure. We owe this great discovery not directly to Galileo himself, but to another Italian named Torricelli, the most famous of Galileo's pupils.

We all know that it is possible by means of a pump to pull up water; and it was found that there was a certain height to which water would rise in a pump—about thirty feet.

A FAMOUS ITALIAN WHO DISCOVERED THE GREAT SECRET OF THE ATMOSPHERE

But no pump will make water rise, say, fifty feet. Thus it was remarked that there is a limit to Nature's dislike of a vacuum! Torricelli thought that other fluids would behave as water does. He thought, also, that the water rises in a pump because of the pressure of the atmosphere, and that if he took a much heavier fluid than water, it also would rise, but, being heavier, would rise so much less. He took the heaviest of all fluids, which is mercury, and he proved that the mercury does rise in the same way as water does, but to a much lower height in proportion, as mercury is heavier than water.

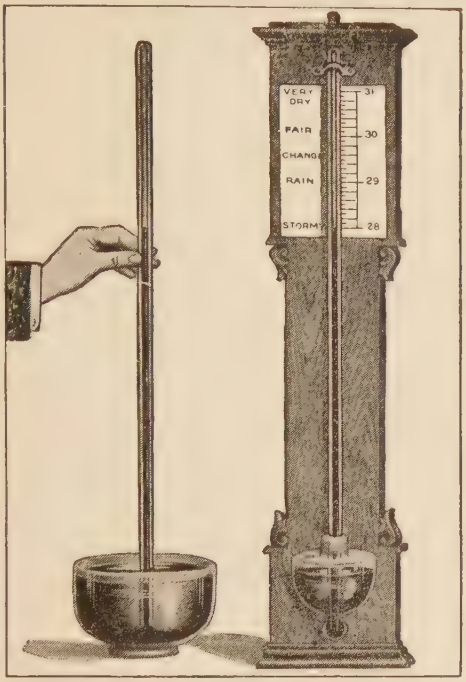
It is very easy to understand the famous experiment of Torricelli, which proved, for the first time, the existence of the atmospheric pressure, and explained why it is that Nature abhors a vacuum. If we take a fine glass tube and fill it with mercury, and then turn it upside down in a cup that already contains mercury, what will happen to the mercury inside the tube? We might expect that all the mercury would run out of the tube into the cup; but, in point of fact, it does not. Something holds up the column of mercury in the tube. The earth, we know, is pulling by gravitation upon that column of mercury. What is the opposing force that holds it up? The answer is that it is the atmospheric pressure pressing down upon the surface of the mercury in the cup, and, so to speak, pressing some of it up into the glass tube.

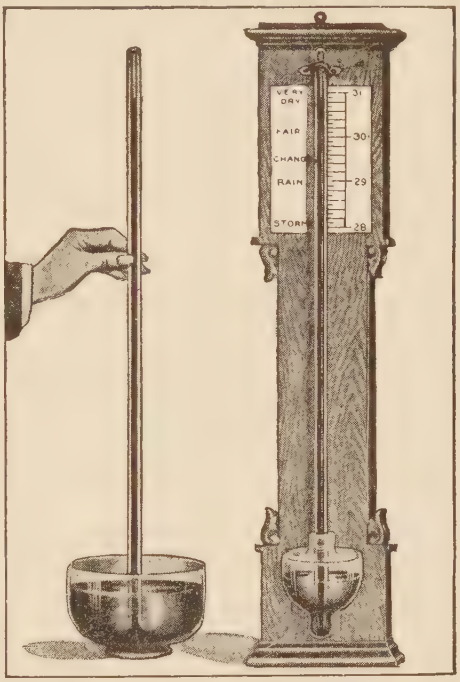
THE PRESSURE OF AIR THAT WILL BALANCE A COLUMN OF METAL

Now, if the tube is short, the mercury will fill it; but if we use a long tube, say, three feet long, and if, having filled it with mercury, we turn it upside down in a cup of mercury, the column of mercury will not be completely held up. On the average, the mercury will drop about six inches. In other words, the pressure of the atmosphere is, as a rule, about equal to supporting a column of mercury thirty inches high.

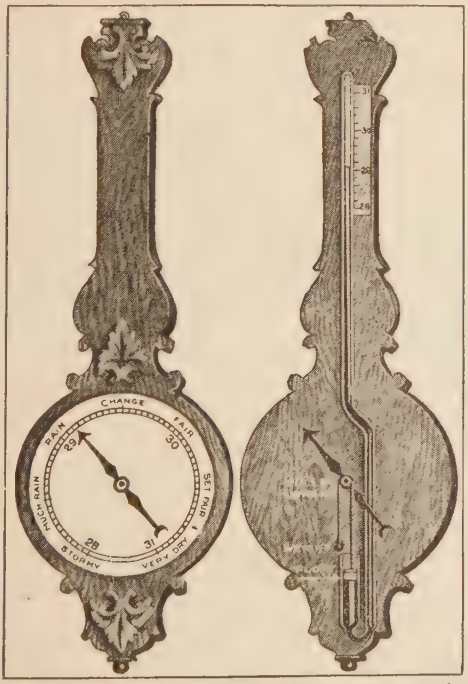
It is interesting to ask what fills the space in the tube above the level of the mercury when the mercury drops. There cannot be any air there; and we might suppose that there must be nothing there—that it must really be a genuine vacuum. In point of fact, it is as nearly a perfect vacuum as we can obtain, and it has been known, since the time we are speaking of, as a Torricellian vacuum; but it is not perfectly empty, for liquid mercury very easily turns itself into a gas, or vapour, and so, though there is no air in a Torricellian vacuum, it contains a certain amount of the vapour of mercury. It is in some

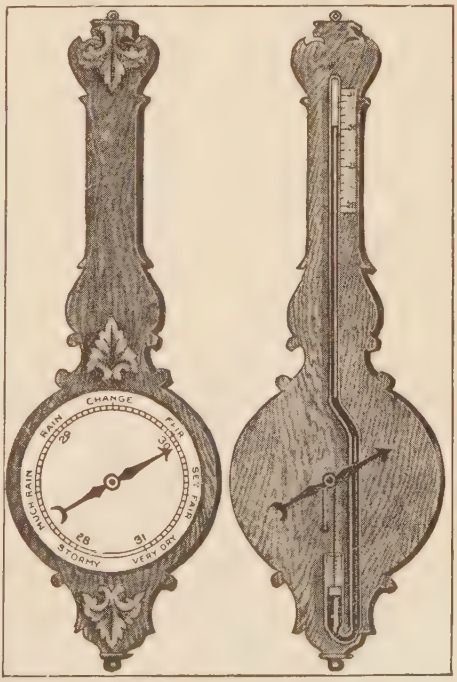
HOW THE BAROMETER TELLS THE WEATHER





Torricelli, an Italian, first discovered the pressure of the atmosphere. These pictures show his experiment and how it is adapted to the standard barometer. A column of mercury is supported in a tube, standing in a bowl of mercury, by the pressure of the air on the mercury in the bowl. When the air is light, the mercury sinks in the tube, as in the first picture; but the pressure of heavy air drives the mercury high up, as in the second picture.





In these pictures we see what is known as the syphon barometer, with a syphon-shaped tube, a dial, and an indicator. The face has been removed to show how the hand works. As the mercury rises or falls in the open end of the tube, an ivory weight moves up and down, and, by means of a chain passing over a wheel, turns the hand.

degree possible, by various means, to prevent the mercury from evaporating much; and so we can get in such a tube the nearest approach to empty space that is possible for us, although we may just remind ourselves that, however empty of ordinary matter we make this space, the ether, that fills all space, will even be there.

How we are able to measure the pressure of the atmosphere

Now, we have noticed that it is possible to measure the length of a column of mercury in one of these tubes, and so, if the atmospheric pressure were greater or less one day than the next, we ought to notice that the column of mercury in the tube is of a different length on the two days. If the atmospheric pressure is high, strong, and pressing down more firmly on the surface of the mercury in the vessel, then it ought to be able to hold up a longer column of mercury; and if the atmospheric pressure is low, it will not hold up such a long column of mercury.

When we think of a man pressing down with his fist on a table, or think of the game people sometimes play at fairs when a man strikes with a hammer upon a knob, and the harder he strikes the higher a weight runs up a pole, we realise what happens in the case of the column of mercury. Thus, this experiment of Torricelli's not only proves the existence of the atmospheric pressure, but it also enables us to measure it.

But, apart from such changes as may occur owing to something happening in the atmosphere, we ought to be able to show that if we rise high up in the atmosphere, the column of mercury in the tube falls, because the higher we rise, the less is the weight of air above us, and the less must be the atmospheric pressure. In the same way the pressure of water increases as we go downwards into the sea, as every diver knows.

What happened one day to a tube of mercury on a mountain

A still more famous man than Torricelli, the great French thinker Pascal, made this experiment very shortly after Torricelli's work was begun. He took one of Torricelli's tubes up to a considerable height, and found when he got there that the level of the mercury was much lower than it had been. As he came down again he watched the mercury, and found that its level rose, because there was now a greater pressure of the atmosphere upon the surface of the mercury contained in the vessel. The variation of the atmospheric pressure at different heights has many interesting results. For instance, when men go up in a balloon, they feel the consequences of the steady lessening of the pressure upon which breathing depends, and they may suffer very severely. There is a thing called mountain sickness, which might also be called balloon sickness, and which depends upon this lessening of the atmospheric pressure. A good many people sleep badly at low pressures of the atmosphere—that is to say, when they go among the mountains—and do better at the sea, where, of course, the pressure of the atmosphere is as high as it can be.

It has lately been proved, also by an Italian—and that is quite appropriate—that when people have lived for a few days at some great height, the body produces a greatly increased number of red blood cells—those which carry oxygen from the lungs to the tissues.

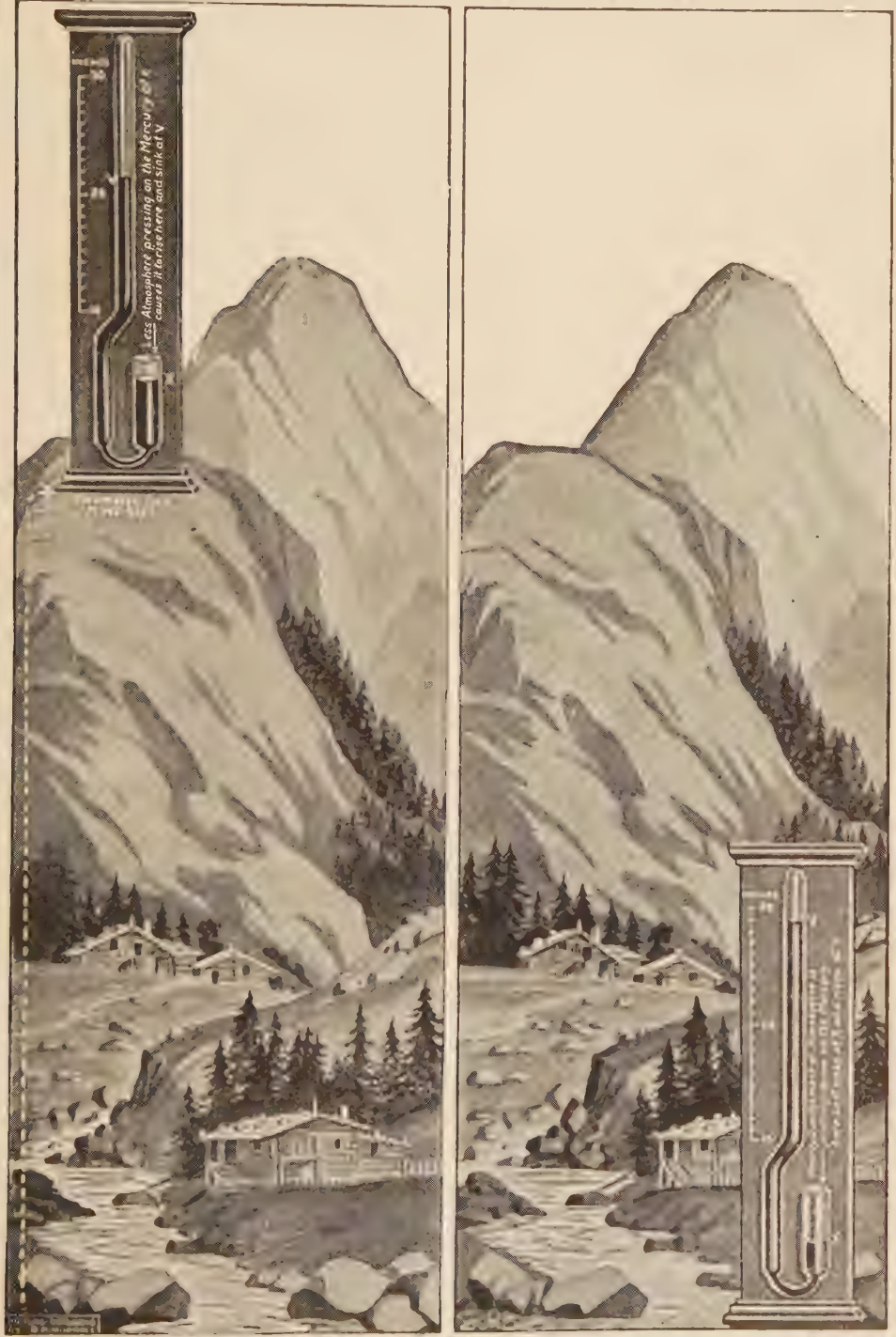
The wonderful way in which our body fits itself to air pressure

On a mountain-top the air is so rare, as we say, or the atmospheric pressure so low, that the body must make special arrangements accordingly. It is very wonderful indeed that the body can adapt itself in this fashion to the altered conditions of the atmosphere.

Now, if in a Torricelli tube we have a means of measuring the pressure of the atmosphere, we have what we may call a barometer, which really means a weight measurer; and that is why it was said just now that there is one kind of fluid pressure which we have all of us measured many times. Every time we have looked at the barometer we have really been measuring the pressure of the atmosphere, for that is all that the barometer does.

No doubt our ordinary way of reading the barometer rather hides what we are really doing. We simply look to see if a little pointer is pointing to "Set fair" or to "Changeable," and we look on the barometer as a thing that prophesies the kind of weather that we are going to have. As a matter of fact, however, it does nothing but measure the atmospheric

MEASURING A MOUNTAIN WITH AIR



The height of a mountain can be measured with a barometer. In the left-hand picture we see a barometer on a mountain two miles high. The pressure of the atmosphere on the cistern, X, causes the mercury to rise to a certain height in the tube, V. Down in the valley, the greater weight of the air on the cistern makes the mercury rise higher in the tube, and by comparing the two readings of the barometer the height of the mountain is discovered.

pressure at the place and time in question. The pointer is so made as to indicate the height in inches of the column of mercury which the atmosphere will hold up, then and there.

WHY A BAROMETER TELLS US WHAT THE WEATHER WILL BE

The relation of the barometer to the weather lies in the fact that, on the whole, the most important thing in deciding the weather is the atmospheric pressure. If the atmospheric pressure is very high at a place, there will be no disturbance there; but if it is very low, then air will be rushing towards that place from other places where the pressure is higher. That means wind, and wind may mean rain. So we see where the connection between the barometer and the weather comes in; and when we find, as we sometimes do, that the barometer cannot quite be trusted as a weather-glass, we must remember that the causes of the weather are very complicated, and that the atmospheric pressure, though the most important of them, is only one of them. We have a way of giving things names according to the use we put them to, and so we may call the mercurial barometer a weather-glass, but that is certainly not its proper name.

For the matter of that we might call it a mountain measurer; for, as we can now quite readily understand, this simple instrument actually gives us a way of discovering how high a mountain is. All we have to do is to find out how much the mercury falls in it for every thousand feet that we go up, and then we can reckon how high a mountain is. There is, however, one serious condition attached to this method, which is—first climb your mountain! That is often impossible; and in any case there are more accurate ways of measuring the heights of mountains than with a barometer.

HOW THE MERCURY IN THE TUBE MOVES THE POINTER OF THE BAROMETER

The ordinary barometer that we see everywhere is really just Torricelli's instrument; but the end of the tube is usually turned up so as to make it U-shaped, instead of having the tube straight and the end of it in a vessel of mercury. If we float an iron ball on the top of the mercury, where the tube is open, we can easily attach to the ball some arrangement with a pointer which can tell us what the height of the mercury is in the tube, or it can be made to point to words like fair or rain.

There is another kind of barometer which has no mercury or any other liquid in it, and which is called an aneroid barometer. This literally means the barometer that has no fluid in it. It is simply a round, flat, metal box which has been emptied of air as far as possible. The top and the bottom of the box are pressed towards each other by the atmosphere more or less, according to whether the atmospheric pressure is high or low, and it is not difficult to make arrangements by which we can easily read off the extent to which the box is being pressed. The results attained by this instrument are not at all precise, but it is quite useful to have in the house as a weather-glass.

If we took an ordinary mercury barometer and made it warm, the mercury would expand, and take up more space in the tube, as most things do when they are warmed. Therefore, if we want our results to be precise, we should always be able to allow for the temperature when using a barometer.

THE AIR PRESSES UPON US EQUALLY IN ALL DIRECTIONS

So a good barometer always has a thermometer, or heat measurer, with it. In making a barometer, we should first boil the mercury, so as to get out of it all the air and water-vapour that we can. If we omit to do this, of course the air and water-vapour will pass out of the mercury, when we have made our barometer, into the Torricellian vacuum at the top of the tube, and they will prevent the mercury from rising as high as it ought to do.

If we take our reckoning at Washington, as we generally do, we find that the pressure of the atmosphere is equal to the pressure of rather more than fourteen pounds on every square inch of surface. Our own bodies are, of course, exposed on every square inch of their surface to this great pressure; and if the pressure were wholly a downward one, weighing upon our heads, we could not stand it. But a great law about fluid pressure is that at any place it is the same in all directions. Therefore, though we are pressed down upon, we are also pressed in upon from the side, and thus we are equally

supported from all directions, and the atmospheric pressure does us no harm. If it should happen that at any part of our bodies we were not equally pressed upon, we should soon notice a rather startling result. If we take a little glass tube, and burn something in it, so that it becomes filled with hot air, and then quickly press the mouth of it against the skin, it is interesting to see what follows. The air inside the tube is very hot, and air, we know, like most things, stretches, or expands, when it is hot. But in a little while the air becomes cooled, and as it cools it shrinks. This means that the pressure inside the tube is lower than outside it. Another way of putting this is that the pressure on the piece of skin covered by the tube is less than the general atmospheric pressure upon the rest of the body.

The laws of force are bound to have their way; the pressure upon the skin outside the tube squeezes some of the fluids of the body up into the tube, and the skin inside the tube—which is not being pressed upon as the rest of the skin is—is forced up into the tube by the pressure of the fluid underneath it, sometimes quite a long distance, forming a sort of little finger of skin.

A BOY'S GAME THAT PROVES A SCIENTIFIC LAW

If a medical student has nothing better to do, and puts three or four such tubes on his forehead, and walks about with them sticking there, he looks very absurd indeed, but he teaches those who see him that the pressure of the atmosphere upon the surface of our bodies is a very real thing.

The game that boys play with a sucker and a stone also depends on the atmospheric pressure. We know that a piece of soft leather, when moistened, will catch on to a stone and lift it up; but, of course, the instant the corner of the leather is raised, and the air is allowed to rush in, the stone will drop. If boys could live on the moon they certainly could not play this game there, because the moon has practically no atmosphere.

We have already learnt that it is the atmospheric pressure by which we breathe. Sometimes, however, instead of wishing to draw air into our lungs, we wish to draw water into our mouths. Take the case of sucking lemonade through a straw, or of filling a syringe with ink for a fountain-pen. It is the atmospheric pressure that we use in these cases, too. When we suck through the straw, all we do is to lower the pressure at the end of the straw that is in our mouths, and then the pressure upon the surface of the fluid in the tumbler pushes some of it up the straw.

WHY THE WATER COMES OUT OF THE PUMP

If we keep the tip of our tongue over the end of the straw, we can hold the column of fluid in the straw in spite of the attraction of gravity. But when we take our tongue away and allow the pressure at both ends of the straw to be equal, gravity has no force to oppose it, and the column of fluid falls.

Such use of a straw is just the same as the way in which a syringe is filled; and an ordinary pump is just the same as a syringe. Inside the pump there is a thing called a piston which fits it closely, and when the piston is raised, it lowers the pressure inside the pump, and liquid is sucked up—that is to say, pushed into the pump from outside by the atmospheric pressure. It is a mere detail whether, when we have got the liquid into the thing, we send it out by the way it came, as we do in a garden syringe, or whether we provide another opening for it somewhere else, as we do in a pump.

We all know those bottles that are often called siphons, which are so made that the liquid in them will run up a long tube and then down another. Properly, we should simply call the tube itself a siphon. If we take such a bent tube quite apart from the bottle, and fill it with water, and then put one end of it in a tumbler of water, as the picture upon page 580 shows, the water will all run out at the other end.

WHY A SIPHON WILL EMPTY A GLASS OF WATER

It is the atmospheric pressure that forces it out. If we look at the picture we can understand what must happen. The liquid in the limb of the tube that runs downwards must, of course, tumble out; for gravity is pulling it, and there is no other force opposing gravity. But as it falls out, it must lower the pressure in the tube; it must tend to leave an empty space

behind it; and now the atmospheric pressure pressing on the surface of the fluid in the tumbler has its chance, and pushes some of the fluid up the tube, and so the tumbler may be emptied.

The atmospheric pressure is the most important, and perhaps the easiest to understand, of all kinds of fluid pressure. When we go more closely into the laws of fluids, we find them exceedingly difficult, yet one or two of the great results are easy to understand. The law that the pressure of a fluid at any point is equal in all directions has already been mentioned. If, however, we are to state this law quite correctly, we must add one more word. We must say not "a fluid," but "a motionless fluid." Of course, directly we introduce a new thing—which is the motion of the fluid—then the whole case is changed. For instance, we do not feel the atmospheric pressure to any noticeable extent, but we *do* feel the wind.

An extraordinary man who discovered the law of equal pressure

This law of the equality of fluid pressure in all directions stands to the credit of that extraordinary Frenchman Pascal, whom we have already mentioned. He is to be called extraordinary because his mind was so complete. People who study religion and duty and good and evil have to read the works of Pascal, because he thought so wisely and deeply on those subjects; people who study pure mathematics have to make acquaintance with Pascal; and people who study what happens in a tumbler of water have to study Pascal, too. In the whole history of mankind there are only a very few cases like this.

Now, it is interesting to invent an experiment to prove the truth of Pascal's law. If we take an empty bottle and cork it, and push it down into deep water, or rather sink it by attaching a weight to it, the fluid pressure will force the cork into the bottle. Now, we find that it does not matter whether the bottle is right side up or upside down, or placed at any angle, the result is just the same. Therefore, to take the case of a fish swimming in the water, it is subjected to a pressure which is upwards as well as downwards and sideways. The point is that the fluid has no greater tendency to press anything in one direction more than in another. Here we find the great difference between fluid pressure and the pressure of this book on the table, or the table on the floor, or the beams of the roof against the walls of the house. The pressure exerted by one solid thing on another is in one direction only.

Gases that can be squeezed and liquids that cannot

The great laws of fluid pressure are the same for both kinds of fluids; but it is very plain to everyone that, however true this may be, there must be some very great difference between the kind of fluid we call a gas and the kind we call a liquid. If we take any gas, or mixture of gases, and squeeze it, we find that it can be squeezed. When we cease to apply the force by which we squeeze it, then it expands again. The proper way of saying this is that a gas is compressible; but the other kind of fluid, which we call a liquid—as, for instance, water—is, practically, not compressible.

It has been proved comparatively recently that it is possible, with very great pressure indeed, to compress water a very little. We should understand this; but still there remains the great difference that a gas is readily compressible, and that a liquid is for all practical purposes quite incompressible. Now, as gases can be compressed by pressure, we ought to know whether there is any law governing the results. There is such a law, and that is the last thing we need learn in this part of our subject.

The discovery of Robert Boyle which explains a gas explosion

It was discovered by, and is named after, a celebrated Englishman named Robert Boyle, who lived in the seventeenth century. Boyle's law says that if the temperature of a gas remains the same, the greater its pressure the less space it fills. If this pressure is to rise, the volume must fall; and if the pressure is to fall, the volume must rise. This means that a certain proportion of gas will exert more pressure in proportion as it occupies a smaller space. We realise this when we cause a great explosion, by suddenly making a lot of gas in a very little space.

The next part of this is on page 4047.

Flowers are visited by insects that carry the pollen, and according to the habits of the insect that visits it, so a flower opens early or late. Here we see, on the left, goat's-beard, and on the right, scarlet pimpernel, that open early in the morning; and in the middle, white campion, that opens at evening.

THE HABITS OF FLOWERS

CONTINUED FROM 3834

We know that plants differ in their liking for certain kinds of soils, as well as in choice of locality. Further, they often show a strong preference for either dry or wet ground; that is due to their degree of thirst, that, in turn, may be said to depend upon the thickness of their skins. The plants and trees we call evergreens are not thirsty because their leaves have hard, polished skins which do not allow the water in the plant to evaporate.

The less quickly the water is lost by the leaves the less work the roots have to do in sucking up moisture from the earth; therefore, of succeeding crops of plants which have been forced to grow in dry localities, those with the toughest skins have survived, and gradually each kind becomes perfectly protected as to foliage, and sometimes as to stems, against this loss of water, thus being comfortable where thinner-leaved plants would soon perish. That is why the cactus and the stonecrops can flourish on the driest, hottest, and stoniest soils.

It also follows that if we take the plants that grow in any place, and closely look at the different kinds found there, we shall find that they all agree pretty much in the structure of their leaves and stems from this point of view. If we go across a sandy heath to gather flowers, we shall get purple heath, heather, harebell, furze, sedges, and pine. Now, if we gather a bunch of these to carry home, they will not wither in our hands. But if we go along the riverside and gather meadow-sweet, forget-me-not, and water plantain, we shall find them all hanging their heads when we get home, and they may not revive when we put them in water.

If the seeds of the waterside plants get carried to the heath, or those of the heath plants are taken to the waterside, they may sprout, but they will never become full-sized plants, because they are not fitted for growth under such conditions. When we have learned that a certain kind of plant grows by the river, or in a marsh, we shall never expect to find it growing on the sandy heath. And so we shall find that we can safely describe a plant as a rock plant, a hedgerow plant, a woodland plant, a waterside plant, a field plant, or a plant of some other dwelling-place.

When we come to read books on botany we shall find the special haunt of a plant spoken of as its *habitat;* but if we remember that

habitat means simply the place the plant inhabits—its dwelling-place—the word will not be a hard one.

All plants have their proper flowering time, and they are so precise that we may go out to find their flowers at the usual season and be sure to find them; that is to say, in any year when the weather is what we have a right to expect about that date. In some years the spring is late because the cold of winter has continued much longer than is usual. In such a year the spring flowers will also be late, for they go by seasons rather than by days of the month. They put out their flower-buds and open them when the weather is most suitable for their purpose.

But what we should like to learn is *how* the plants know when is the right time. How do the snowdrops and crocus bulbs buried in the ground know when the frost has gone? How does the almond-tree get its beautiful pink flowers out before its leaves are seen? How does the coltsfoot, that has not a leaf above ground, get word that the time has come to send up its yellow flower-heads? They do not know beforehand exactly when that time will be, but they know it will come, and that they must be ready for it.

How the plants wait for the sun before peeping out of the ground

And at the end of the autumn the snowdrop and crocus fit themselves out with a new set of roots, and their flower-buds and leaves having already been formed, though still very tiny in size and hidden right in the heart of the bulb, they set to work piercing the earth with their leaves. But before they reach the surface they find it is very cold—perhaps the top soil is frozen hard—and they rest. Then, when the thaw comes, the warm spring rain soaks down through the soil, and the plants know they may safely break through the surface.

There may come a change, and for some days, or even weeks, only the tips of the leaves show. But when the mild weather has really set in, the leaves are rapidly enlarged, the flower-buds are pushed up, and a very little sunshine will cause them to open out.

We must not imagine that the plant forms its flower-buds only a short time before they open. With garden *annuals*, the seeds of which we know are not sown until March or April, there cannot be any getting ready much in advance of the flowering time, but with bulbous plants and spring-flowering trees and shrubs the flowers in their buds were all formed by the autumn before.

The wonder of the buds in which the tiny flowers are housed

When we go gathering wood-nuts in October we can see pairs of hard, grey tassels hanging from the twigs. These are the lamb's-tails that will be long, soft, and yellow in March next. While we are picking ripe apples from the tree we can tell which of the buds are leaf-buds and which are flower-buds, by the latter being much more plump than the former. When hyacinth bulbs are bought in the autumn for planting in the garden, if we look into the hole at the top we can see that the tiny flower-buds have already formed.

What seems more wonderful than plants being affected by the seasons, is the way they know the time of day. We have day flowers and evening flowers; but the day flowers do not all open early in the morning, neither do they all remain open until the sun sets. The goat's-beard, which is a summer flower, opens about four o'clock in the morning, and is often closed by ten or eleven; always before twelve o'clock. And so, in some parts, people call it John-go-to-bed-at-noon.

The pimpernel always closes early in the afternoon, like most other flowers that open early in the morning. None of the evening flowers open before about six o'clock. If we look at the evening primrose in the garden by day, we shall find all its flowers are closed, limp, and discoloured. But early in the evening, if we watch it, we shall see the fresh buds burst suddenly, and the beautiful yellow petals expand before our eyes. At the same time their strong, sweet perfume will fill the air. We may observe the white tobacco plant of the garden and the white campion of the cornfield behave in much the same way.

A clock that told the time by the opening of the flowers

Linnæus, the great Swedish botanist, was so struck by the way in which so many flowers kept regular hours for opening and closing that he made a floral clock by planting a bed with

plants which opened their flowers one after the other. Of course, such a clock could only be used in summer-time.

There is no doubt that plants can tell what is the time of day by the amount of light, and until the proper strength of light is reached the bud of the plant does not open. But this does not explain the whole matter, for there are times of day when the evening light is of the same strength as the morning light.

HOW THE FLOWERS OPEN IN TIME TO RECEIVE THEIR INSECT GUESTS

During the summer months, when the greatest number of plants flower, the light at six o'clock in the evening is just as intense as it was at six o'clock that morning. So the plant that should flower in the morning must have some other means of telling the difference between morning and evening, and it is not easy to say how it does so. There can be little doubt that plants have some special powers of which we know little or nothing.

Why one plant opens in the morning and another in the evening is a question that we can answer without much trouble. All flowers that invite insects to fetch and carry pollen for them must take care to have their flowers open during the hours those insects are flying about. If they are not open at these times, their bright colours and nectar to attract and reward will be wasted, and, worse than all else, they will produce no seed. Therefore we find that as bees are abroad early, the flowers that want their aid are also open early. Few butterflies are about before nine or ten o'clock, and so the butterfly flowers only open about that time, and close about five or six in the evening. Few moths fly before dusk, so the moth flowers remain open till late at night and close till at least six in the evening.

A FLOWER THAT REMAINS OPEN ALL DAY AND ALL NIGHT

The honeysuckle is a flower that makes use of bees, butterflies, and moths, so its flowers remain open all day and night. Many plants have their pollen carried by some special insect and no other, so they have learned to keep their flowers open only during the hours in which that insect is at work.

The question of the effect of light on the opening of flowers brings us back, for a few moments, to the question of dwelling-places, because we shall find that the amount of light in different places has played a large part in their choice by the plants that grow there. If we walk through a pine-forest we shall be struck by the small number of plants we find there. The greater part of it is carpeted with a deep layer of dead pine-leaves, with here and there rounded cushions of a silvery-green moss. There are two reasons for this: one is that this leaf carpet is rather dry, but the chief reason is that the leafy twigs at the top of the trees form a roof that shuts out much of the light in both winter and summer, and few plants can grow in the dim light that comes through.

A beech-wood, in which the leafy branches come lower down the trunks of the trees, is also rather dim in summer; but in winter and spring, when there are no leaves, the light is strong, and plants can do well in it so long as they get their year's work all done before the summer comes. This means that the plants living there have had to learn to get their flowering over in the spring.

WHY THE BEECH-WOOD HAS FEWER FLOWERS THAN THE OAK-WOOD

Spring is the time to see the entire floor of the beech-wood carpeted with such flowers as wood anemones, and the one woodruff, violets—not in ones and twos, but in countless myriads. In summer-time their leaves have mostly disappeared, and only their ripe seed-vessels are to be seen, among some later plants that like the dimmer light.

In summer we shall find very few plants in flower in the beech-wood, and those that are there are plants that live chiefly upon the decaying beech-leaves, and so require less light. The false beech-drops is one of these, and it gets all it wants from these leaves; therefore, it does without leaves of its own or any green parts. Where a little light comes sideways under the branches, another kind of beech-drops, living on beech roots, is found, together with sanicle, that lays its leaves flat on the bare ground to get all the light it can.

In oak-woods, which are also on moister soil, the light is stronger because, owing to the way in which the sides of the oak-leaves are cut, a good deal more light finds its way between the leaves and branches of the trees. So

we find many more wild flowers—and with them ferns—in the oak-wood than in the beech-wood. But whether in oak-wood or beech-wood, or even under the shade of hedges in the lanes, the greater number of the plants have to get their work done in spring, before the thick growth of leaves overhead shuts out the light and causes them to rest.

WHY THE FLOWERS OF SPRING ARE FOUND BENEATH TREES AND BUSHES

That is why some of them appear to be in such a hurry to pop up their heads as soon as the frosts have gone, and why they have disappeared altogether from sight before the wild roses are out. If we think of any wild flower of spring, and the place where it grows, we shall almost always find that the place is over-shaded by the trees and bushes when they are covered with leaves, or by the summer-flowering plants of taller and coarser growths.

Long, long ago, some of the plants with the smallest flowers must have found out that, with bigger and higher flowers around them, they were in danger of being overlooked by the insects. It was not to their interest to make their flowers large, because they were already fitted for the small beetles and flies that did the work of carrying their pollen for them. So they hit upon the good idea of bringing a large number of their tiny flowers together. You will find this idea carried out by such plants as Jack-by-the-hedge, the bedstraws, woodruff, and others. Then plants like the parsley, carrot, parsnip, hogweed, and a host of others, arranged their tiny white or yellow flowers each on a little footstalk, but made a score or two of these footstalks start off from the tops of a tall stem, so that they looked like the ribs of an umbrella when the wind has blown it inside out. On that plan all the tiny little flowers came close together in a flat bouquet, and, of course, were then seen as easily from a distance as any large flower.

HOW THE PLANTS WITH LITTLE FLOWERS IMPROVE THEIR BLOSSOMS

The elder-tree and the wayfaring-tree followed a similar plan, and made huge flat bunches of their small white flowers. But the guelder rose improved upon the plan. It seems to have said: "We can make our bunches larger still, if the outer row will agree to give up their stamens and pistils, and put all their strength into making themselves as big as they can." So the outer flowers, though they wanted to make seeds as well as the others, agreed to give up their own wishes for the good of their race, and to-day, if we look at a bunch of these flowers, we shall find that the outer blossoms are twice the size of the others, but they have not a stamen or a pistil among them.

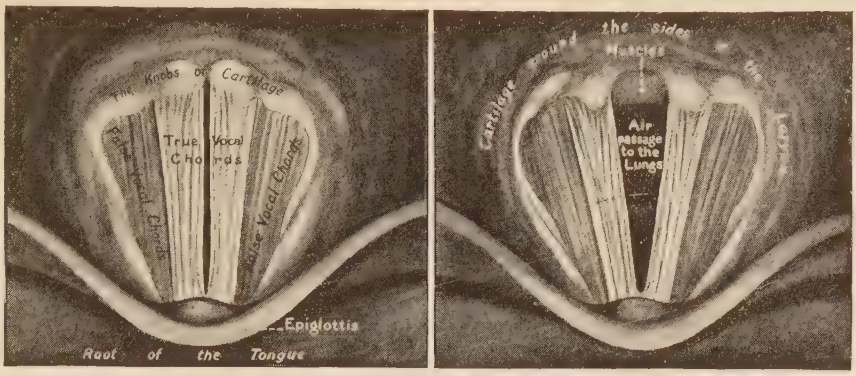
We do not know that plants copy each other, and try to "go one better," as boys and girls and men and women do; but if we were telling a fairy story about the flowers, we should feel warranted in making the dandelion say: "I know a better plan than that. What a waste to have all those short footstalks to your flowers! Build a platform at the top of your flower-stem, and on that pack a couple of hundred flowers as close as they will go." What we call a dandelion flower is really two hundred flowers, as you can see by pulling one of the golden flower-heads to pieces.

THE DAISY THAT PACKS ITS WHITE AND YELLOW FLOWERS ON A PLATFORM

Then, in our fairy tale, we could make the daisy say that it had a better plan even than that of the dandelion. "I shall pack my flowers together as she has done, but I will make mine brighter by getting the outer row to give up their stamens and put their strength into making long white ribbons to stick out all round, and set off the yellow flowers in the middle. They need not give up their hope of seeds; they can still have their pistils, and the insects will bring enough pollen for them as well as for the yellow flowers." If we pick a daisy head and compare it with a dandelion head, we shall see just this difference between them. Thistle and sunflower, pansy and oxeye, coltsfoot and ragwort, hawkweed and chicory, have all heads of closely packed flowers, and they look as though some had copied the dandelion, and others the daisy.

When we are out of doors, in the garden or the fields, we must look at all the kinds of flowers we can find, and must take note of their shapes and colours, and see where they grow, and what kinds of insects are settling upon them. Then we shall become interested in all the flowers and learn to love them.

The next story of Plant Life is on page 4109.



In the first of these pictures, which shows the larynx, or voice-box, we see the vocal cords in the position for producing a sound. The air is forced through the narrow slit, vibrating the cords. In the second picture we see the vocal cords at rest. The epiglottis covers the larynx when we are swallowing.

HEARING AND SPEAKING

PRECIOUS THINGS IN OUR LIVES THAT BEGAN IN FISHES

CONTINUED FROM 3872

THE inner ear would be quite sufficient to make the bone that contains it the most wonderful in the body. We know that that bone is the hardest in the body; and this is necessary not only because it forms part of the base of the skull and should be strong, but also, we suppose, because a hard bone conducts sound-waves better than a more loosely-built one.

We must understand that the important thing in hearing is for sound-waves somehow or other to get to the hair-cells. Much the best way is through the fine series of structures about which we read on page 3870; but though they are very useful, and though we cannot hear anything like so well without them, they are not necessary.

From the teeth, or from the bones of the head in general, sound-waves can be conducted—and, of course, are conducted, whenever we hear—which are conveyed very well by the dense bone that contains the inner ear, and so get to its hair-cells. Sound-waves reaching the ear in this way contribute to the keenness of our hearing, but, of course, they cannot compare for effectiveness with those that travel along the wonderful path made for the special purpose of hearing. But there is another reason why the bone that contains the inner ear is of very great importance and interest. It also contains another organ of a wholly distinct sense, which lies close beside the inner ear, and is, indeed, in more or less direct communication with it. For many years it was supposed that this organ was part of the inner ear, and was concerned with hearing. We now know that it has nothing to do with hearing.

The mistake was made more natural by the fact that one and the same nerve seems to run from the brain to both parts—as they were supposed to be—of the inner ear. In point of fact, what looks like one nerve, and is still called one nerve, is two wholly distinct nerves, as we can readily prove if we trace the course of the fibres towards the brain.

We find that the fibres which have come from the real inner ear all run to a certain part of the brain, the business of which is hearing. But we find that the fibres which have come from this other organ all run to an entirely different part of the brain which has nothing to do with hearing at all.

In fact, what we are here dealing with is the sense of balance, and it is probably more or less of an accident that its machinery happens to be such a close neighbour to that of the sense of hearing.

A LITTLE-KNOWN PART OF OUR BODY THAT HELPS US TO STAND

This sense of balance is, in a way, a sense that tells us about the outside world, like hearing or vision ; because it *does* tell us where the outside world is in relation to our bodies. But it is quite unlike the senses we know so well, as it is not arranged to receive anything from the outside world at all, and so, unlike the eye or ear, it has no connection with the surface of the body. We may say that this is one of the senses which tell the brain about the body, rather than about the world outside the body.

Before we study the organ of this sense, we must notice, in the first place, that it is helped by other means. We do not entirely depend for our balance upon the organs of balance in the base of the skull, though we certainly cannot balance ourselves without their assistance. When we stand, for instance—and standing is a very much more difficult matter than we usually suppose—our power of balance is greatly helped by the feelings we get from the soles of our feet. If something is painted on to the soles of our feet so that the skin there can no longer feel, or in cases of illness which have the same result, we cannot stand so easily as we usually do.

But the sense of balance is also helped by the eyes. As long as the eyes are open, even a person who is not helped by the soles of his feet may balance himself ; or, with his eyes shut, he may yet balance himself if he stands with his feet far apart ; but if he puts his heels together, and shuts his eyes, he will probably topple over on the ground.

THE GREAT USE OF THE EYES IN BALANCING THE BODY

People, however, can stand with their heels together, and with their eyes shut, thus doing without the assistance of sight, if the organs of balance in the skull are all right, and if guidance is also coming to the brain from the soles of the feet, and also from the muscles and joints of the legs. If we set ourselves the task of balancing on a very narrow plank, or, still more difficult, on a tight-rope, then our eyes become more useful, and, unless we are very skilful indeed, they are quite necessary. Everyone knows how the tight-rope walker keeps his eyes steadily fixed on a certain point, and so greatly helps himself. If he is very skilful, he may walk on the tight-rope even though he bandages his eyes ; but this is far more difficult. However, the eyes and the feelings from the skin and joints and muscles are all unimportant compared with the guidance we get from the special organs of balance, and no one was ever yet able to stand or walk on the ground, much less on a tight-rope, in whom these organs were not working properly. Now we must learn what they consist of.

In the hard bone that contains the inner ear, and close to the inner ear—on each side of the head, of course—we find this organ of balance, of which a picture is given on page 3866. It consists of three tiny tubes, in shape like half a circle.

THE SIX LITTLE TUBES WHICH TELL THE BRAIN OUR MOVEMENTS

The proper name for a half-circle is a semi-circle, just as half a tone is a semi-tone, and the corresponding adjective is, of course, semi-circular ; not a difficult word if we know how it is made up. The proper name for these tubes, then, is the *semi-circular canals*, and of these the head of every human being and of all the higher animals contains six, three on each side. They are all filled with fluid.

Just as the nerve of vision runs to the eye and the nerve of hearing to the ear, so the nerve of balance runs to the semi-circular canals. The ends of the nerve—that is to say, the ends of the countless nerve-fibres which make the nerve—lie close to the fluid that fills the canals, and if that fluid moves, or if the pressure on it changes in any direction, the nerve-fibres know about it.

Now let us look at an ordinary child's block, which we call a cube. If we want to measure it, we find that it can be measured in three directions—from top to bottom, from side to side, and from back to front. We may pick up any solid thing, and we find the same is true of it. We may want to measure a room, and we find again that the same is true ; we must measure the floor in both directions, and we must also measure the height of one of the walls.

In general terms, space has three directions—or dimensions, to give the usual word—and when we move our head it must move in one or more of those three directions. We may nod our head, or we may shake our head, or we may raise it up and down. All the possible movements of the head are either in one of these directions or in a combination of two or all three of them. Now, the business of the organ of balance is to acquaint the brain with every possible movement of the head, and it must therefore be so constructed that all possible movements shall duly register themselves in it.

This is done in the most exquisite way by the provision of three canals on each side of the head, these three canals being arranged in correspondence with the three dimensions, or directions, of space. One canal lies on its side, so to speak, or is horizontal; and the other two are upright, but at right angles to each other. As there is an organ of balance on each side of the head, we may think of the canals in pairs, and there is no doubt that they act in pairs. For instance, the horizontal canal on each side of the head acts with its fellow when we shake the head, or when we spin round, as we do in dancing.

The moving fluid in the six little canals in our heads

The consequence of this arrangement is that every possible movement of the head has a strictly corresponding effect upon the fluid inside one or more pairs of these six canals, and the centre of balance in the brain is informed. This centre of balance probably exists in the cerebellum, or little brain. Sometimes we have an illness in which the organ of balance is thrown out of action, and just as a person whose eyes are injured cannot see, so those in whom the organs of balance are injured cannot balance. They suffer from persistent giddiness.

It has also been proved that where the injury affects only certain of the canals, the giddiness corresponds to the direction of the particular canal or canals in question. If it is only the horizontal canals that are thrown out of action, then we shall be all right so far as nodding the head is concerned, but directly we start shaking it, we shall become giddy, and, if we do not receive support, topple over.

The history of the semi-circular canals is deeply interesting. The lowest kind of creature with a backbone, as we know, is the fish, and we find in it no trace of these canals. Now, the fish is very clever at balancing itself, and shows no signs of giddiness; but probably we can explain why the fish manages so well without any semi-circular canals, if we remember how great the pressure of water is upon the surface of the fish, and therefore how much more information the fish must get from its skin than we are able to get from ours.

How birds are able to fly without tumbling over

As we ascend the scale of backboned animals, we gradually find the appearance of these semi-circular canals, though they do not all appear at once. If our statements as to their use are correct, we should expect to find them most beautifully and perfectly developed in birds, which could not succeed in flying without a perfect sense of balance. In flying, the bird gains little from the feet and legs, as we do in the very much simpler business of standing or walking; and therefore its need of special organs of balance is all the greater.

So we find the semi-circular canals at their very best in birds, and we know also that, just as in our own case, if the canals are thrown out of action, the bird's power of balance is destroyed, and in flying it will make mistakes and show peculiarities corresponding to the particular defect in its organ of balance. It is probable that in this way we can explain the peculiarity of what are called "tumbler" pigeons.

It used at one time to be thought, before these newer facts were discovered, that the semi-circular canals must have something to do with hearing; and we can understand how natural this idea was, seeing that the canals look as if they were part of the inner ear, and their nerve looks as if it were a part of the nerve of hearing.

The little organs in our ears that have nothing to do with hearing

The idea used to be that probably we somehow judge of the direction of sound by means of these semi-circular canals.

No one could look at their singular arrangement without feeling that their business had something to do with direction. But we now know that their business is with the direction in which

the head moves, and not with the direction of sound. It is much more important to know what the head is doing than to know where sound comes from, and, in any case, by having external ears that can be moved, a creature can easily enough judge of the direction of sound without any special machinery inside its head. If we human beings are not so well off in this respect, it is because we have lost the power of moving our outer ears like the animals.

THE FISH'S GILLS, UPON WHICH MANY PRECIOUS STRUCTURES ARE BUILT UP

We have lost this power that the animals have, but we have gained many things that the animals have not. In the very lowest vertebrate animals, such as the simplest fishes, and also in the higher fishes, too, we find, instead of lungs, what are called gills. To these the blood runs, as it runs to our lungs, and in them it comes in close relation with the oxygen dissolved in the water, just as in our lungs the blood comes in close relation to the oxygen of the air. The gills have to be supported on something, and so we find in the fish five gill-arches, with slits between them called gill-slits.

Gills did not develop into lungs, but lungs developed from a quite different organ, called the swim-bladder, of the fish. Now, we might suppose that when backboned animals left the water and began to breathe air, no use was found for the gill-slits and gill-arches, as the gills were not made into lungs. But some of the most wonderful and precious structures of the higher backboned animals have been developed from the gill-slits and the gill-arches.

HOW THE SWIM-BLADDER OF THE FISH BECAME THE LUNG OF THE ANIMAL

We can never tell what uses Nature will turn a thing to, and the history of life upon this earth proves over and over again that organs which would appear to have lost all their use, and of which nothing could be made, may be turned to new and utterly different purposes, rather than be wasted. Nature took the swim-bladder, which used to be filled with air, and helped the fish to swim at the level it liked, and when the creature no longer swam under the surface at all, she made it into a lung. Thus Nature, so to speak, had gill-slits and gill-arches thrown on to her hands with their occupation gone. By long and careful study of many animals we have been able to trace what happens to each of these; and it is one of Nature's great triumphs in the development of the bodies of the higher animals that she has been able to do with these apparently useless things what we shall now learn.

Out of them she has made the whole of the semi-circular canals. Thus she has provided for the balance of the bird out of the organs which helped the fish to breathe. From these organs, also, she has made the whole of the ear, including the little bones in the middle ear, and all the wonderful structure of the inner ear. As if this were not enough, she has also made out of the gill-arches an organ no less new and wonderful than the voice-box, or *larynx*, by which we speak and sing. This is, perhaps, the triumph of triumphs, because the gill-arch was invented for a creature living entirely in water, and the whole use of the larynx depends altogether upon the breathing of air.

THE VOICE-BOX, AND THE SERIOUS PART IT PLAYS IN OUR LIVES

Now, instead of going on to study another sense at this point, it is much better, for two very good reasons, that we should go on to study the larynx. First, we should do this because then we shall be studying together the various organs that have been developed in the higher animals from the gill-arches of the fish; and, secondly, we should do so because it is well to study the means by which we produce sounds, after studying the means by which we hear them.

We all know something, at least, about the larynx, because we have all seen the front part of it pushing the skin forward and sometimes moving up and down. There is a foolish notion that this is the apple which Adam swallowed, and which stuck in his throat, and so it is sometimes called Adam's apple. A larynx, or voice-box, similar to ours is to be found in all the higher animals, and, as we know, it is simply a stringed musical instrument. In the case of the birds, many of which have such beautiful voices, there is besides this stringed instrument another, which is practically an organ-pipe. But, in all its forms, and whether with or without this organ-pipe, the larynx is evolved from one of the gill-arches of the fish.

This voice-box, of course, is not only concerned with speaking and singing; it has important duties to perform every moment of our lives, because it is the channel of the breath of life. Further, owing to the manner in which the lungs have been developed in long-past ages, it has so occurred that the opening from the throat to the voice-box lies in front of the opening from the throat to the gullet.

Only the study of the way in which living things have developed one from another can enable us to see any meaning in this arrangement, which, as we know, makes it necessary for everything we swallow, whether liquid or solid, to be thrown over the opening to the larynx without entering it. There is thus placed upon the larynx another duty besides that of producing sound, and that of attending to our breathing, for it has to protect the air-passages every time we swallow. This organ is made of pieces of what is called *cartilage.* Our ordinary name for cartilage is gristle, and we may describe it as something which is half-way towards bone.

THE NARROW CHANNEL THROUGH WHICH PASSES ALL THE BREATH OF LIFE

In old age the cartilages of the larynx get to be not exactly bony, but more chalky and rigid than they are in youth; and this, probably, is one of the reasons why most people with sensitive ears can readily distinguish a young voice from an old voice.

The business of the larynx is to support and control the action of two tiny cords or strings called the *vocal cords;* that is to say, the voice cords. The picture on page 1634 shows what the vocal cords look like when they are seen from above by means of a bright little mirror held at the back of the throat. We see that the vocal cords have a free edge towards the middle, and that from it they pass outwards to the sides of the larynx.

All the air by which we live passes through the narrow space between the vocal cords. The arrangements by which they can be put together or separated are quite simple. They part every time we breathe in, and when we choke and cannot breathe in, it is because the vocal cords are not parting as they should. But if the cords are to produce voice, they must be able to do much more than this. It must be possible to hold them tightly stretched, so that when air is forced against them they will vibrate. Nor is this all, for it must be possible to stretch them in different degrees. As we shall learn when we come to study sound, the pitch—the shrillness or the lowness—of a musical note produced by anything trembling depends upon a number of things, such as its weight, its length, and its tightness.

THE WONDERFUL MUSICAL INSTRUMENT WITH ONE STRING

Now, in the case of a piano, when we want to produce notes of different pitch, we have a number of strings of different lengths laid side by side, so that we can strike the one that gives out the required note. Also, we can have some of them made of much heavier material than others. In the case of the violin, it is possible to have only very few strings, but we can produce all the notes we want by stopping the strings with our fingers, so that the length of string that is free to vibrate can be altered as we please; and the strings are made of different weight and thickness.

But in the larynx there are only two strings, and these always act together, it being impossible to produce voice with one of them; moreover, they are of the same weight and length. Outside the human body, a musical instrument that had practically only one string, and that could not be stopped at different points like a violin string, would not be able to produce much variety of pitch. The only possible way of getting any variety would be to have some means of varying its tightness. It is probably correct to say that there is no material other than that made by life that can be tightened in such different degrees as the needs of music demand, without permanent injury to the strings.

THE MARVELLOUS POWER THAT A GOOD SINGER HAS OVER THE HUMAN VOICE

But though our vocal cords have only the one possibility of varying pitch, due to the fact that they can be tightened in different degree, with this one means they triumph. A good singer can produce all the notes in a range of two octaves, and many singers are able to exceed this compass considerably. Outside the body there is no parallel to

this. It is interesting, therefore, to know of what the vocal cords are made, so that they can stand such varying degrees of tightness, within a few seconds, without injury. They are simply made of fibres of what we call elastic tissue, such as is found in various parts of the body wherever it is needed. But an ordinary piece of elastic is rubbish compared with the elastic tissue made by the body.

HOW THE VOCAL CORDS ARE TIGHTENED TO PRODUCE DIFFERENT SOUNDS

The next question is—How is their tightness varied? In front, just behind the part of the voice-box that we see from outside, the cords are fixed to the largest cartilage of the larynx, but, behind, each of them is fixed to a tiny little knob of cartilage which is delicately jointed to the part that it rests on, so that it can be tilted in several directions.

What really happens when we sing is that these little knobs of cartilage are tilted backwards so that the cords are made tighter when our voice ascends in pitch, and are tilted forwards so that the cords are made slacker when our voice falls in pitch. This is easy to say, but the picture on page 3953 will show what the cords are like; and the muscles which do all this work are tiny little shreds.

When a singer is producing one of his highest notes, the cords have to be so tight as to vibrate four times as often in every second as when he is producing one of his lowest notes. Thus, in the whole range of Nature, there is scarcely anything more perfectly delicate than the control which a singer has over this tiny little machine to produce such results.

WHY THE HUMAN VOICE IS MUCH MORE MARVELLOUS THAN A PIANO

Nor must we suppose that the singer is merely limited to the number of notes that there are on the piano in two octaves. Pianos vary in pitch, as we know, and a singer can tune his voice to the pitch of any piano he sings with. Skilful singers can produce several tones, even as many as eleven, between two notes that are next to each other on the piano.

As we have said, all this depends on the tightness of the cords, and the tightness depends on the strength with which certain tiny slips of muscle pull upon the cartilages to which the cords are attached; and that depends upon the force of the nerve-current sent to the nerves through these muscles from certain nerve-cells in the brain. The place, therefore, where the unrivalled delicacy of this machine really exists is the nerve-centre in the brain.

As everyone knows who has tried to read a song he was not sure of, or as anyone may observe who watches a child learning to sing, it is one thing to have all the machinery for producing a note that is easily within the range of our voice, and it is quite another thing to be able to produce that note when we want to. There are two stages of difficulty here, and the second is marvellous beyond anything we have yet described. The first of these is where we simply imitate a note we hear.

This is quite wonderful enough, for it means the beautiful working together of the cells in the hearing centre of the brain with the cells of that part of the brain which gives orders to the muscles of the voice-box.

THE MYSTERY OF THE WRITING AND SINGING OF MUSIC

But now take the second case, where a singer sings aloud the notes of a piece of music that he has never seen before. What is it that he imitates now? What is it that guides him? We can only say that the singer imitates, or realises, his idea of a certain sound that he has in his mind, but what and where the idea really is, and how the singer can do what he does, no one can say, for we are here in the realm of the mind—the most mysterious of all things, and it baffles us utterly.

Lastly, we have the case of the composer sitting down with a pencil and a sheet of paper, and creating music "out of his head" for other people to sing and play. Some of the greatest music ever written—music which has made miserable people happy, and cowardly people brave, and frivolous people solemn, and will do so to the end of time—was written by a man named Beethoven many years after he had become stone-deaf. He never heard a note of the greatest and most wonderful part of the music that he wrote; and yet, in his mind's ear, he heard it better than anyone has ever heard it since, or he could not have created it.

The next part of this is on page 4073.

A POEM OF SORROW, FAITH, AND HOPE

AS printed among the poet's works, this is a long poem of one hundred and thirty-one sections, with a prologue and an epilogue. It is really a collection of short poems written on different occasions over a period of some sixteen years. As stated on page 2153, the whole is dedicated to the memory of a dear friend of the poet, Arthur Henry Hallam, who was expected, by all who knew him, to become one of the most notable men of England, but died suddenly at Vienna on September 15, 1833, and was brought back by sea and buried at Clevedon, on the Bristol Channel, January 3, 1834. Tennyson's grief at the loss of his friend was so intense that, for many years, the death of Hallam had a constant influence on the poet's life, turning his thoughts to the contemplation of man's destiny, and the effect of grief in purifying the mind of man. The sections are numbered in order here, but the numbers are not, of course, the same as those in the whole poem.

TENNYSON'S "IN MEMORIAM"

CONTINUED FROM 3846

STRONG Son of God, immortal Love,
Whom we, that have not seen Thy face,
By faith, and faith alone, embrace,
Believing where we cannot prove;

Thine are these orbs of light and shade;
Thou madest Life in man and brute;
Thou madest Death; and lo, Thy foot
Is on the skull which Thou hast made.

Thou wilt not leave us in the dust:
Thou madest man, he knows not why,
He thinks he was not made to die;
And Thou hast made him: Thou art just.

II.

IN GRIEF'S FIRST HOUR

Tennyson's great poem begins as above, striking at once a note of confident hope in the goodness and mercy of God. Overshadowed by the loss of his dear friend, he naturally asks himself whether he and his friend will live again, and continue in another life the friendship of this. He has been studying works of philosophy concerning the origin of the world and man, but from them he only comes to know that we cannot understand the inner mysteries of the world and life, and must be content with simple faith in God's mercy. But despite his faith, he finds himself wandering sorrowfully in the street where his beloved friend had lived.

Dark house, by which once more I stand
Here in the long unlovely street,
Doors, where my heart was used to beat
So quickly, waiting for a hand,

A hand that can be clasp'd no more—
Behold me, for I cannot sleep,
And like a guilty thing I creep
At earliest morning to the door.

He is not here; but far away
The noise of life begins again,
And ghastly thro' the drizzling rain
On the bald street breaks the blank day.

III.

THE LAST JOURNEY OF THE DEAD

"Every pleasant spot" where the friends had been in the habit of meeting now seems dark to him, and blank despair has for the moment driven hope and faith away. The poet's soul has now begun to feel with a new keenness in his grief, but his thoughts are again sweet and gentle when he contemplates the last journey of his dead friend over seas to the quiet resting-place by the waters of the Severn.

Fair ship, that from the Italian shore
Sailest the placid ocean-plains
With my lost Arthur's loved remains,
Spread thy full wings, and waft him o'er.

So draw him home to those that mourn
In vain: a favourable speed
Ruffle thy mirror'd mast, and lead
Thro' prosperous floods his holy urn.

I hear the noise about thy keel;
I hear the bell struck in the night:
I see the cabin window bright;
I see the sailor at the wheel.

Thou bring'st the sailor to his wife,
And travell'd men from foreign lands;
And letters unto trembling hands;
And, thy dark freight, a vanish'd life.

So bring him: we have idle dreams:
This look of quiet flatters thus
Our home-bred fancies: O to us,
The fools of habit, sweeter seems

To rest beneath the clover sod,
That takes the sunshine and the rains,
Or where the kneeling hamlet drains
The chalice of the grapes of God;

Than if with thee the roaring wells
Should gulf him fathom-deep in brine;
And hand so often clasp'd in mine
Should toss with tangle and with shells.

IV.

IF THE LOST CAME BACK

"Is this the end of all my care?" the poet asks himself when the body of his friend has been hidden in the dark grave. In the depth of his grief his reason is not calm enough to answer him, and he can only resign himself to his sorrow and to what time may teach him. In these verses he expresses the commonest feelings of humankind: the difficulty at first of believing that a dear friend, who has just died, will never meet us and speak to us again in this world.

If one should bring me this report,
That thou hadst touch'd the land to-day,
And I went down unto the quay,
And found thee lying in the port;

And standing, muffled round with woe,
Should see thy passengers in rank
Come stepping lightly down the plank,
And beckoning unto those they know;

And if along with these should come
The man I held as half divine;
Should strike a sudden hand in mine,
And ask a thousand things of home;

And I should tell him all my pain,
And how my life had droop'd of late,
And he should sorrow o'er my state,
And marvel what possess'd my brain;

And I perceived no touch of change,
No hint of death in all his frame,
But found him all in all the same,
I should not feel it to be strange.

V.

NATURE'S SOOTHING INFLUENCE

"Calm despair and wild unrest" are now the two opposing feelings struggling within him, but when he comes again to the grave of his friend, the very gentleness of the natural scenes has a soothing influence on his spirit, and he writes:

The Danube to the Severn gave
The darken'd heart that beats no more;
They laid him by the pleasant shore,
And in the hearing of the wave.

There twice a day the Severn fills;
The salt sea-water passes by,
And hushes half the babbling Wye,
And makes a silence in the hills.

The Wye is hush'd nor moved along,
And hush'd my deepest grief of all,
When fill'd with tears that cannot fall,
I brim with sorrow drowning song.

The tide flows down, the wave again
Is vocal in its wooded walls;
My deeper anguish also falls.
And I can speak a little then.

VI.

MEMORIES OF THE LOST FRIEND

His grief is still a purely personal emotion, and has not yet led him into the wider and deeper feelings which we call "universal," because they embrace mankind as a whole. It is still of their old remembered companionship he sings.

The path by which we twain did go,
Which led by tracts that pleased us well,
Thro' four sweet years arose and fell,
From flower to flower, from snow to snow:

And we with singing cheer'd the way,
And, crown'd with all the season lent,
From April on to April went,
And glad at heart from May to May:

But where the path we walk'd began
To slant the fifth autumnal slope,
As we descended following Hope,
There sat the Shadow fear'd of man;

Who broke our fair companionship,
And spread his mantle dark and cold,
And wrapt thee formless in the fold,
And dull'd the murmur on thy lip,

And bore thee where I could not see
Nor follow, tho' I walk in haste;
And think that, somewhere in the waste,
The shadow sits and waits for me.

VII.

THE SACRIFICE OF LOVE

But in the presence of this "Shadow cloaked from head to foot," which is, of course, Death, "who keeps the keys of all the creeds," the poet begins to ponder over the great mysteries of man's life and destiny. His thoughts of life, however, are always involved with memories of his friend.

I know that this was Life—the track
Whereon with equal feet we fared;
And then, as now, the day prepared
The daily burden for the back.

But this it was that made me move
As light as carrier-birds in air;
I loved the weight I had to bear,
Because it needed help of Love:

Nor could I weary, heart or limb,
When mighty Love would cleave in twain
The lading of a single pain,
And part it, giving half to him.

VIII.

THE LESSONS OF LIFE

From his personal feelings he now begins to draw the real lessons of life, and as the wildness of despair gives place at length to more reasonable and calmer thoughts, he is able to contemplate his loss with calmness and resignation.

I envy not in any moods
The captive void of noble rage,
The linnet born within the cage,
That never knew the summer's woods.

I envy not the beast that takes
His license in the field of time,
Unfetter'd by the sense of crime,
To whom a conscience never wakes;

Nor, what may count itself as blest,
The heart that never plighted troth,
But stagnates in the weeds of sloth;
Nor any want-begotten rest.

I hold it true, whate'er befall,
I feel it, when I sorrow most,
'Tis better to have loved and lost
Than never to have loved at all.

IX.

THE MESSAGE OF THE BELLS

Then, with the approach of Christmastide, and all its holy memories, he finds his very sorrow touched with joy. New feelings of hope, and a serene happiness, born of his rising faith in God's mercy, now dwell in that breast where so recently the wildness of sorrow and despair had reigned.

The time draws near the birth of Christ;
The moon is hid, the night is still,
The Christmas bells from hill to hill
Answer each other in the mist.

Four voices of four hamlets round,
From far and near, on mead and moor,
Swell out and fall, as if a door
Were shut between me and the sound:

Each voice four changes on the wind,
That now dilate, and now decrease,
Peace and goodwill, goodwill and peace,
Peace and goodwill, to all mankind.

This year I slept and woke with pain,
I almost wish'd no more to wake,
And that my hold on life would break
Before I heard those bells again;

But they my troubled spirit rule,
For they controlled me when a boy;
They bring me sorrow touch'd with joy,
The merry, merry bells of Yule.

X.

THE POET'S FAITH AND DOUBT

His faith in the promises of God, as revealed to us in the teachings of Jesus, is not yet absolute, and his mind is not without its doubts, but he has emerged from his darkest sorrow with the conviction that the grave is not the end of all.

My own dim life should teach me this,
That life shall live for evermore,
Else death is darkness at the core,
And dust and ashes all that is;

This round of green, this orb of flame,
Fantastic beauty; such as lurks
In some wild Poet, when he works
Without a conscience or an aim.

What then were God to such as I?
'Twere hardly worth my while to choose
Of things all mortal, or to use
A little patience ere I die.

'Twere best at once to sink to peace,
Like birds the charming serpent draws,
To drop head-foremost in the jaws
Of vacant darkness and to cease.

XI.

DO THE DEPARTED THINK OF US?

It is springtime again, and the poet still is singing his mournful songs in memory of his friend. For the first time we find him wondering whether the spirit of the departed takes any interest in the life on earth, and, if so, he cannot but think these songs of his will be grateful to the spirit's ear.

With weary steps I loiter on,
Tho' always under alter'd skies
To purple from the distance dies,
My prospects and horizon gone.

No joy the blowing season gives,
The herald melodies of spring,
But in the songs I love to sing
A doubtful gleam of solace lives.

If any care for what is here
Survive in spirits render'd free,
Then are these songs I sing of thee
Not all ungrateful to thine ear.

XII.

THE PURPOSE OF ALL LIFE

From this thought he goes on to speculate upon the life of the departed. "How fares it with the happy dead?" he asks, and suggests that theirs is indeed the larger life, to which all the joys and sorrows and good and evil of this world we live in are but the dim and bungling preparations.

Oh, yet we trust that somehow good
Will be the final goal of ill,
To pangs of nature, sins of will,
Defects of doubt, and taints of blood;

That nothing walks with aimless feet;
That not one life shall be destroyed,
Or cast as rubbish to the void,
When God hath made the pile complete;

That not a worm is cloven in vain;
That not a moth with vain desire
Is shrivell'd in a fruitless fire,
Or but subserves another's gain.

And moving up from high to higher,
Becomes on Fortune's crowning slope
The pillar of a people's hope,
The centre of a world's desire;

Yet feels, as in a pensive dream,
When all his active powers are still:
A distant dearness in the hill,
A secret sweetness in the stream.

The limit of his narrower fate,
While yet beside its vocal springs
He play'd at counsellors and kings
With one that was his earliest mate;

Who ploughs with pain his native lea
And reaps the labour of his hands,
Or in the furrow musing stands;
"Does my old friend remember me?"

XIII.

WHEN GRIEF IS PAST

This, then, is the wide and universal hope that has grown within the soul of the poet, as he has turned from his own personal sorrows to contemplate the sorrows of all mankind, and to look with clearer faith upon the work of God. He has no longer any doubt that God has created man not as the mere creature of a passing day, but as an inheritor of immortal life. He begins also to feel half ashamed of his grief, saying that "The song of woe is, after all, an earthly song," and in the larger love of mankind, which Jesus came to teach, he finds the joy that far outweighs the loss of a friend. Another year has passed; it is Christmas once more.

Again at Christmas did we weave
The holly round the Christmas hearth;
The silent snow possess'd the earth,
And calmly fell our Christmas-eve.

The Yule-log sparkled keen with frost,
No wing of wind the region swept,
But over all things brooding slept
The quiet sense of something lost.

As in the winters left behind,
Again our ancient games had place,
The mimic picture's breathing grace,
And dance and song and hoodman-blind.

Who showed a token of distress?
No single tear, no mark of pain:
O sorrow, then can sorrow wane?
O grief, can grief be changed to less?

O last regret, regret can die!
No—mixt with all this mystic frame,
Her deep relations are the same,
But with long use her tears are dry.

XIV.

THOUGHTS AT THE COMING OF SPRING

The poet is thus uneasy at the thought that his sorrow for his friend has lessened. It is personal feeling again pushing against the wider love of humanity, and in the following beautiful song of spring he calls upon the warmer season of the year to thaw his frozen sorrow and let it flower again.

Dip down upon the northern shore,
O sweet new year delaying long;
Thou doest expectant Nature wrong,
Delaying long; delay no more.

What stays thee from the clouded noons,
Thy sweetness from its proper place?
Can trouble live with April days,
Or sadness in the summer moons?

Bring orchis, bring the foxglove spire,
The little speedwell's darling blue,
Deep tulips dash'd with fiery dew,
Laburnums, drooping-wells of fire.

O thou, new year, delaying long,
Delayest the sorrow in my blood,
That longs to burst a frozen bud
And flood a fresher throat with song.

XV.

WHAT MIGHT HAVE BEEN

His mind is back again entirely with his friend, when he sings thus of what might have been had the lost one lived to marry the poet's sister, to whom he had been engaged.

When I contemplate all alone
The life that had been thine below,
And fix my thoughts on all the glow
To which thy crescent would have grown,

I see thee sitting crown'd with good,
A central warmth diffusing bliss
In glance and smile, and clasp and kiss,
On all the branches of thy blood ;

Thy blood, my friend, and partly mine ;
For now the day was drawing on,
When thou shouldst link thy life with one
Of mine own house, and boys of thine

Had babbled " Uncle " on my knee ;
But that remorseless iron hour
Made cypress of her orange flower,
Despair of Hope, and earth of thee.

I seem to meet their least desire,
To clap their cheeks, to call them mine.
I see their unborn faces shine
Beside the never-lighted fire.

I see myself an honour'd guest,
Thy partner in the flowery walk
Of letters, genial table-talk,
Or deep dispute, and graceful jest ;

While now thy prosperous labour fills
The lips of men with honest praise,
And sun by sun the happy days
Descend below the golden hills

With promise of a morn as fair ;
And all the train of bounteous hours
Conduct by paths of growing powers
To reverence and the silver hair ;

Till slowly worn her earthly robe,
Her lavish mission richly wrought,
Leaving great legacies of thought,
Thy spirit should fail from off the globe.

What time mine own might also flee,
As link'd with thine in love and fate,
And, hovering o'er the dolorous strait
To the other shore, involved in thee ;

Arrive at last the blessed goal,
And He that died in Holy Land
Would reach us out the shining hand,
And take us as a single soul.

What reed was that on which I leant ?
Ah, backward fancy, wherefore wake
The old bitterness again, and break
The low beginnings of content.

XVI.

FAMILIAR SCENES REVISITED

For a time the thoughts of the poet are again entirely with the departed ; then comes a visit to Cambridge, where they had been at college together, but the sense of personal loss is no longer felt, the gloom has lifted from the poet's mind.

I passed beside the reverend walls
In which of old I wore the gown ;
I roved at random thro' the town,
And saw the tumult of the halls ;

And heard once more in college fanes
The storm their high-built organs make,
And thunder-music, rolling, shake
The prophets blazon'd on the panes ;

And caught once more the distant shout,
The measured pulse of racing oars
Among the willows ; paced the shores
And many a bridge, and all about

The same grey flats again, and felt
The same, but not the same ; and last
Up that long walk of limes I passed
To see the rooms in which he dwelt.

Another name was on the door :
I linger'd ; all within was noise
Of songs, and clapping hands, and boys
That crash'd the glass, and beat the floor ;

Where once we held debate, a band
Of youthful friends, on mind and art,
And labour, and the changing mart,
And all the framework of the land ;

When one would aim an arrow fair,
But send it slackly from the string ;
And one would pierce an outer ring,
And one an inner, here and there ;

And last the master-bowman, he,
Would cleave the mark. A willing ear
We lent him. Who but hung to hear
The rapt oration flowing free.

From point to point, with power and grace
And music in the bounds of law,
To those conclusions when we saw
The God within him light his face,

And seem to lift the form, and glow
In azure orbits heavenly wise ;
And over those ethereal eyes
The bar of Michael Angelo.

XVII.

THE MINGLING OF JOY AND REGRET

Through many sections of the poem the writer recalls events in his friendship with his lost companion, but there is always a feeling of joy now in his expressions of grief, no wavering note of doubt when he sings of the greater things of life and immortality. Another Christmas finds him calm of mind and strong in faith, as when he sings " Ring out, wild bells, to the wild sky," and ends that song—see page 2153—with the joyous note " Ring in the Christ that is to be ! "

Now fades the last long streak of snow,
Now burgeons every maze of quick
About the flowering squares, and thick
By ashen roots the violets blow.

Now rings the woodland, loud and long,
The distance takes a lovelier hue,
And drown'd in yonder living blue
The lark becomes a sightless song.

Now dance the lights on lawn and lea,
The flocks are whiter down the vale,
And milkier every milky sail
On winding stream or distant sea ;

Where now the seamew pipes, or dives
In yonder greening gleam, and fly
The happy birds, that change their sky
To build and brood ; that live their lives

From land to land ; and in my breast
Spring wakens too ; and my regret
Becomes an April violet,
And buds and blossoms like the rest.

XVIII.

WHAT TIME HAS TAUGHT THE POET

So at last the poet's personal grief has passed away; "lived down," as we say. Time has indeed taught him wisdom, and he is wise in the confident hope that far better than unavailing sorrow for the dead is the steady faith in the reunion of friends in after life, "some strong bond which is to be."

Is it, then, regret for buried time
That keenlier in sweet April wakes,
And meets the year, and gives and takes
The colours of the crescent prime?

Not all: the songs, the stirring air,
The life re-orient out of dust,
Cry thro' the sense to hearten trust
In that which made the world so fair.

Not all regret: the face will shine
Upon me, while I muse alone;
And that dear voice, I once have known,
Still speak to me of me and mine.

Yet less of sorrow lives in me
For days of happy commune dead;
Less yearning for the friendship fled,
Than some strong bond which is to be.

XIX.

THE END OF MAN

The last thoughts of the poet, freed from all contemplation of his own feelings, are with mankind as a whole, and in his vision he sees the ultimate triumph of life over death, of good over evil. Man is no mere animal, but capable of love and suffering and hope, and these are but the seeds of what will flower and bear fruit in the after life of the soul.

Whereof the man, that with me trod
This planet, was a noble type
Appearing ere the times were ripe,
That friend of mine who lives in God,

That God, which ever lives and loves,
One God, one law, one element,
And one far-off divine event,
To which the whole creation moves.

THE FLIGHT OF PETER BELL

The lines which we give here are merely the introductory verses to a long poem by William Wordsworth, entitled "Peter Bell: A Tale." The whole is a fanciful and not unprofitable story, but the imagination of the poet is seen in its most attractive guise in these introductory verses, which form of themselves a complete little poem.

THERE'S something in a flying horse,
There's something in a huge balloon;
But through the clouds I'll never float
Until I have a little boat
Shaped like the crescent-moon.

And now I have a little boat,
In shape a very crescent-moon;
Fast through the clouds my boat can sail;
But if perchance your faith should fail,
Look up—and you shall see me soon!

The woods, my Friends, are round you roaring,
Rocking and roaring like a sea;
The noise of danger's in your ears,
And ye have all a thousand fears
Both for my little Boat and me!

Meanwhile untroubled I admire
The pointed horns of my canoe;
And, did not pity touch my breast
To see how ye are all distrest
Till my ribs ached, I'd laugh at you!

Away we go, my Boat and I—
Frail man ne'er sate in such another;
Whether among the winds we strive,
Or deep into the clouds we dive,
Each is contented with the other.

Away we go—and what care we
For reason, tumults, and for wars?
We are as calm in our delight
As is the crescent-moon so bright
Among the scattered stars.

Up goes my Boat among the stars
Through many a breathless field of light,
Through many a long blue field of ether,
Leaving ten thousand stars beneath her:
Up goes my little Boat so bright.

The Crab, the Scorpion, and the Bull—
We pry among them all; have shot
High o'er the red-haired race of Mars,
Covered from top to toe with scars;
Such company I like it not.

The towns in Saturn are decayed,
And melancholy Sceptres throng them—
The Pleiads, that appear to kiss
Each other in the vast abyss,
With joy I sail among them.

Swift Mercury resounds with mirth,
Great Jove is full of stately bowers;
But these, and all that they contain,
What are they to that tiny grain—
That little Earth of ours?

Then back to Earth, the dear green Earth—
Whole ages if I here should roam,
The worlds for my remarks and me,
Would not a whit the better be;
I've left my heart at home.

See! there she is, the matchless Earth!
There spreads the famous Pacific Ocean!
Old Andes thrust yon craggy spear
Through the grey clouds; the Alps are here,
Like waters in commotion.

Yon tawny slip is Libya's sands,
That silver thread the Dnieper;
And look, where clothed in brightest green
Is a sweet isle, of isles the Queen;
Ye fairies, from all evil keep her.

And see the town where I was born!
Around those happy fields we span
In boyish gambols; I was lost
Where I have been, but on this coast
I feel I am a man.

Never did fifty things at once
Appear so lovely, never, never;
How tunefully the forests ring!
To hear the earth's soft murmuring
Thus could I hang for ever.

ARMAGEDDON

Armageddon is the name given to the place whereon it is said that God will one day gather all His enemies and destroy them for ever. The idea of such a poetic ending to the forces of evil that prevail in the world is often used by writers, and in this fine poem by Sir Edwin Arnold, who was born June 10, 1832, and died in 1904, it is made the theme of a stirring "war poem of the future"; the eventual great battle in which the right will prevail. The poem is given here by permission of Messrs. Kegan, Paul & Co.

MARCHING down to Armageddon—
Brothers, stout and strong!
Let us cheer the way we tread on
With a soldier's song!
Faint we by the weary road,
Or fall we in the rout,
Dirge or Pæan, Death or Triumph!
Let the song ring out!

We are they who scorn the scorners—
Love the lovers—hate
None within the world's four corners—
All must share one fate;
We are they whose common banner
Bears no badge or sign,
Save the light which dyes it white—
The Hope that makes it shine.

We are they whose bugle rings,
That all the wars may cease;
We are they who pay the Kings
Their cruel price for Peace;
We are they whose steadfast watchword
Is what Christ did teach,
"Each man for his Brother first—
And Heaven, then, for each."

We are they who will not falter—
Many swords or few—
Till we make this earth the altar
Of a worship new;
We are they who will not take
From palace, priest, or code,
A meaner Law than "Brotherhood"—
A lower Lord than God.

Marching down to Armageddon—
Brothers, stout and strong!
Ask not why the way we tread on
Is so rough and long!
God will tell us when our spirits
Grow to grasp His plan!
Let us do our part to-day—
And help Him, helping Man!

Shall we even curse the madness,
Which for "ends of State"
Dooms us to the long, long sadness
Of this human hate?
Let us slay in perfect pity
Those that must not live;
Vanquish, and forgive our foes—
Or fall—and still forgive.

We are those whose unpaid legions,
In free ranks arrayed,
Massacred in many regions—
Never once were stayed;
We are those whose torn battalions,
Trained to bleed, not fly,
Make our agonies a triumph—
Conquer, while we die!

Therefore, down to Armageddon—
Brothers, bold and strong;
Cheer the glorious way we tread on
With this soldier's song!
Let the armies of the old Flags
March in silent dread!
Death and Life are one to us,
Who fight for Quick and Dead!

WHY THE ROBIN'S BREAST IS RED

It is curious to think that James Ryder Randall, the American poet who sang in praise of the Confederates in "Maryland, My Maryland," during the Civil War in this country, and wrote the famous song of the South, "There's Life in the Old Land Yet," was also a writer of tender religious verse. In the following little poem he uses a very old and beautiful legend about the robin redbreast for the purpose of teaching a very necessary lesson in religious life.

THE Saviour, bowed beneath His cross,
climbed up the dreary hill,
And from the agonising wreath ran many a
crimson rill;
The cruel Roman thrust Him on with unrelenting hand,
Till, staggering slowly mid the crowd, He
fell upon the sand.

A little bird that warbled near, that memorable day,
Flitted around and strove to wrench one
single thorn away.
The cruel spike impaled his breast, and thus,
'tis sweetly said,
The robin has his silver vest incarnadined
with red.

Ah, Jesu! Jesu! Son of Man! My dolour
and my sighs
Reveal the lesson taught by this winged
Ishmael of the skies.
I, in the palace of delight or cavern of despair,
Have plucked no thorns from Thy dear brow,
but planted thousands there!

MEMORY

Thomas Bailey Aldrich, a famous American poet, expresses in these lines a curious fact which most people have experienced, though it is not until we have grown up that we notice it. Some quite unimportant events in our lives will be remembered by us far better than we can ever remember dates which are supposed to be of the greatest importance. Perhaps Memory is wiser than we are in thus calling to our mind the things of which we had taken least account.

MY mind lets go a thousand things,
Like dates of wars and deaths of kings,
And yet recalls the very hour—
'Twas noon by yonder village tower,
And on the last blue moon in May—
The wind came briskly up this way,
Crisping the brook beside the road;
Then, pausing here, set down its load
Of pine-scents, and shook listlessly
Two petals from that wild-rose tree.

ROSE AND ROOT

John James Platt, the writer of this little fable in verse, was an American poet of some distinction, born in 1835. The moral of the tiny story is that the real reward of good work is not its being seen by others, but the knowledge which the worker possesses of doing the good work for its own sake.

THE rose aloft in sunny air,
Beloved alike by bird and bee,
Takes for the dark root little care,
That toils below it ceaselessly.

I put my question to the flower:
"Pride of the summer, garden queen,
Why livest thou thy little hour?"
And the rose answered: "I am seen."

I put the question to the root.
"I mine the earth, content," it said,
"A hidden miner underfoot:
I know a rose is overhead."

BIRDS*

Richard H. Stoddard, a well-known American poet, in these verses gives us a pretty little fancy. It is a happy thought to liken the fleeting visions of the poet's brain to the birds that flit past the open cage, and yet the poet, even in the following lines, has "caged" very daintily one of these fleeting fancies.

BIRDS are singing round my window,
Tunes the sweetest ever heard;
And I hang my cage there daily,
But I never catch a bird.

So with thoughts my brain is peopled,
And they sing there all day long;
But they will not fold their pinions
In the little cage of Song!

THE ELIXIR

George Herbert is one of the finest religious poets who have written in the English language. He came of a noble family, being born at Montgomery Castle, Wales, on April 3, 1593. He died on March 3, 1633, and his life was written by Izaak Walton. This is a good example of his poetry, and it is given in the quaint spelling of his time. "The Elixir" was a supposed magic stone that changed base metal into gold.

TEACH me, my God and King,
In all things Thee to see;
And what I do in anything,
To do it as for Thee.

Not rudely, as a beast,
To runne into an action;
But still to make Thee prepossest,
And give it his perfection.

A man that looks on glasse,
On it may stay his eye;
Or, if he pleaseth, through it passe,
And then the heaven espie.

All may of Thee partake:
Nothing can be so mean,
Which with his tincture (for Thy sake)
Will not grow bright and clean.

A servant with this clause
Makes drudgerie divine:
Who sweeps a room, as for Thy laws,
Makes that and th' action fine.

This is the famous stone
That turneth all to gold;
For that which God doth touch and own
Cannot for lesse be told.

LONDON, 1802

This famous sonnet by William Wordsworth was composed in London, as the title indicates, at a period when the outlook for England was somewhat doubtful, as Napoleon was lording it over Europe. The poet was impressed by the need of some great voice, like that of Milton's, to inspire the nation with patriotic fervour; but, fortunately, though no great poet arose, circumstances forced the British people to a supreme effort, and not many years later Napoleon was a prisoner of the British in lonely St. Helena; for British heroism had won the decisive battle of Waterloo.

MILTON! thou shouldst be living at this hour:
England hath need of thee; she is a fen
Of stagnant waters: altar, sword, and pen,
Fireside, the heroic wealth of hall and bower,
Have forfeited their ancient English dower
Of inward happiness. We are selfish men;
Oh! raise us up, return to us again;
And give us manners, virtue, freedom, power.
Thy soul was like a Star, and dwelt apart;
Thou hadst a voice whose sound was like the sea:
Pure as the naked heavens—majestic, free—
So didst thou travel on life's common way,
In cheerful godliness; and yet thy heart
The lowliest duties on herself didst lay.

TO THE LORD GENERAL CROMWELL

In this great sonnet Milton addresses Oliver Cromwell before he has been declared Protector of the Commonwealth. The poet rejoices in the victories of the Puritan arms, but reminds the great soldier that in the time of peace that is coming there are other victories to be won, and the foes of religious freedom still to be fought.

CROMWELL, our chief of men, who through a cloud
Not of war only, but detractions rude,
Guided by faith and matchless fortitude,
To peace and truth thy glorious way hast ploughed,
And on the neck of crowned fortune proud
Hast reared God's trophies, and His work pursued,
While Darwen stream with blood of Scots imbrued
And Dunbar field resounds thy praises loud,
And Worcester's laureate wreath. Yet much remains
To conquer still; peace hath her victories
No less renowned than war: new foes arise
Threatening to bind our souls with secular chains;
Help us to save free conscience from the paw
Of hireling wolves, whose gospel is their maw.

ABIDE WITH ME

There are few hymns in our language more popular throughout the churches than this. An interesting story attaches to the writing of it. The author was a well-known minister and hymn-writer—see page 1785—named H. F. Lyte, and he wrote these verses in the evening of the Sunday on which he preached his last sermon. It is thus a very real expression of the human heart leaning in its last hours of life to the Creator. For "Abide with Me" is not, as many suppose, an evening hymn, but a hymn of closing life, as it was the dying song of him who wrote it.

ABIDE with me! fast falls the eventide,
The darkness deepens: Lord, with me abide!
When other helpers fail, and comforts flee,
Help of the helpless, oh, abide with me!

Swift to its close ebbs out life's little day;
Earth's joys grow dim; its glories pass away;
Change and decay in all around I see:
O Thou, who changest not, abide with me!

Not a brief glance I beg, a passing word:
But as Thou dwell'st with Thy disciples, Lord—
Familiar, condescending, patient, free—
Come, not to sojourn, but abide, with me!

Come not in terrors, as the King of kings;
But kind and good, with healing in Thy wings;
Tears for all woes, a heart for every plea;
Come, Friend of sinners, and thus 'bide with me!

I need Thy presence every passing hour;
What but Thy grace can foil the tempter's power?
Who like Thyself my guide and stay can be?
Through cloud and sunshine, oh, abide with me!

I fear no foe, with Thee at hand to bless:
Ills have no weight, and tears no bitterness:
Where is Death's sting? Where, Grave, thy victory?
I triumph still, if Thou abide with me.

Hold then Thy cross before my closing eyes!
Shine through the gloom, and point me to the skies!
Heaven's morning breaks, and earth's vain shadows flee:
In life and death, O Lord, abide with me!

* From "Poems of Richard Henry Stoddard," copyright, 1880, by Charles Scribner's Sons.

INCIDENT OF THE FRENCH CAMP

In this poem Robert Browning relates a real event which happened in Napoleon's war with Austria in 1809. The only difference between the poet's account of the incident and the actual episode is that the hero was a man and not a boy.

You know we French stormed Ratisbon,
A mile or so away ;
On a little mound, Napoleon,
Stood on our storming day ;
With neck out-thrust, you fancy how,
Legs wide, arms locked behind,
As if to balance the prone brow
Oppressive with its mind.
Just as perhaps he mused " My plans
That soar to earth may fall,
Let once my army leader, Lannes,
Waver at yonder wall."
Out 'twixt the battery-smokes there flew
A rider, bound on bound
Full galloping ; nor bridle drew
Until he reached the mound.
Then off there flung in smiling joy,
And held himself erect
By just his horse's mane, a boy ;
You hardly could suspect—
So tight he kept his lips compressed,
Scarce any blood came through—
You looked twice ere you saw his breast
Was all but shot in two.
" Well," cried he, " Emperor, by God's grace
We've got you Ratisbon !
The Marshal's in the market-place,
And you'll be there anon
To see your flag-bird flap his vans
Where I, to heart's desire,
Perched him ! " The chief's eye flashed ; his plans
Soared up again like fire.
The chief's eye flashed ; but presently
Softened itself, as sheathes
A film the mother-eagle's eye
When her bruised eaglet breathes ;
" You're wounded ! " " Nay," his soldier's pride
Touched to the quick, he said :
" I'm killed, Sire ! " And his chief beside
Smiling the boy fell dead.

PEACE

Henry Vaughan was the name of a doctor who lived from 1622 to 1695 and wrote many poems of a religious character. This little poem of abiding faith in God is taken from his works.

My soul, there is a country
Afar beyond the stars,
Where stands a winged sentry,
All skilful in the wars.
There, above noise and danger,
Sweet peace sits crowned with smiles,
And One born in a manger
Commands the beauteous files.
He is thy gracious Friend,
And (O my soul awake !)
Did in pure love descend,
To die here for thy sake.
If thou canst get but thither,
There grows the flower of peace—
The rose that cannot wither—
Thy fortress, and thy ease.
Leave, then, thy foolish ranges ;
For none can thee secure,
But One who never changes—
Thy God, thy Life, thy Cure.

THE BUILDERS

Longfellow in this little poem seeks to remind us that in every action of our lives we are building the house of our future. That is to say, what we are doing well or ill to-day, and what we did ill or well yesterday, will mean much in the days to come. So it behoves us, as it does all good builders, to see that everything we do is of our best.

All are architects of fate ;
Working in these walls of time :
Some with massive deeds and great,
Some with ornaments of rhyme.

Nothing useless is or low ;
Each thing in its place is best ;
And what seems but idle show
Strengthens and supports the rest.

For the structure that we raise
Time is with materials filled ;
Our to-days and yesterdays
Are the blocks with which we build.

Truly shape and fashion these,
Leave no yawning gaps between ;
Think not, because no man sees,
Such things will remain unseen.

JESUS BIDS US SHINE

The following has long been popular as a children's hymn, for which purpose its simple language makes it particularly suitable. The name of the writer is Emily H. Miller.

Jesus bids us shine
With a pure, clear light ;
Like a little candle
Burning in the night ;
In this world of darkness,
So we must shine—
You in your small corner,
And I in mine.

Jesus bids us shine,
First of all for Him ;
Well He sees and knows it
If our light is dim.
He looks down from heaven
To see us shine—
You in your small corner,
And I in mine.

Jesus bids us shine,
Then, for all around ;
Many kinds of darkness
In the world abound.
Sin and want and sorrow ;
So we must shine—
You in your small corner,
And I in mine.

COMPOSED UPON WESTMINSTER BRIDGE

One of Wordsworth's finest sonnets, there are probably no lines about London more often quoted than these. It was one morning in the summer of 1802 that the poet, driving over Westminster Bridge on his way to Dover, was so struck with the grandeur of the scene, the great city still sleeping beneath the early sun, that the poem took shape in his mind, and he wrote the words as he travelled to Dover.

Earth has not anything to show more fair :
Dull would he be of soul who could pass by
A sight so touching in its majesty :
This City now doth like a garment wear
The beauty of the morning : silent, bare,
Ships, towers, domes, theatres, and temples lie
Open unto the fields, and to the sky,
All bright and glittering in the smokeless air.
Never did sun more beautifully steep
In his first splendour valley, rock, or hill ;
Ne'er saw I, never felt, a calm so deep !
The river glideth at his own sweet will :
Dear God ! the very houses seem asleep ;
And all that mighty heart is lying still !

UNDER a toadstool
Crept a wee Elf,
Out of the rain,
To shelter himself.

Under the toadstool,
Sound asleep,
Sat a big Dormouse
All in a heap.

Trembled the wee Elf,
Frightened, and yet
Fearing to fly away
Lest he got wet.

To the next shelter—
Maybe a mile!
Sudden the wee Elf
Smiled a wee smile.

Tugged till the toadstool
Toppled in two.
Holding it over him,
Gaily he flew.

Soon he was safe home,
Dry as could be.
Soon woke the Dormouse—
"Good gracious me!

"Where is my toadstool?"
Loud he lamented—
And that's how umbrellas
First were invented.

THE NONSENSE OF EDWARD LEAR

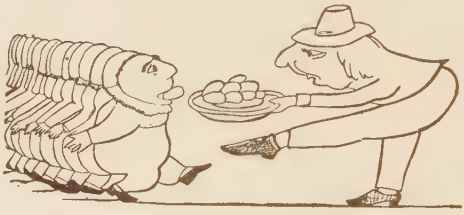
THERE was an old man in a pew,
Whose waistcoat was spotted with blue;
But he tore it in pieces,
To give to his nieces,
That cheerful old man in a pew.

THERE was a young lady of Portugal,
Whose ideas were excessively nautical;
She climbed up a tree,
To examine the sea,
But declared she would never leave Portugal.

THERE was an old man of Aôsta,
Who possessed a large cow, but he lost [her;
But they said, "Don't you see,
She has rushed up a tree?
You invidious old man of Aôsta!"

THERE was an old man with a poker,
Who painted his face with red oker;
When they said, "You're a guy!"
He made no reply,
But knocked them all down with his poker.

THERE was an old lady of Chertsey,
Who made a remarkable curtsey;
She twirled round and round,
Till she sunk underground,
Which distressed all the people of Chertsey.



THERE was an old man of Apulia,
Whose conduct was very peculiar;
He fed twenty sons
Upon nothing but buns,
That whimsical man of Apulia.

THERE was an old person of Rhodes,
Who strongly objected to toads;
He paid several cousins
To catch them by dozens,
That futile old person of Rhodes.

THERE was an old person of Basing,
Whose presence of mind was amazing;
He purchased a steed,
Which he rode at full speed,
And escaped from the people of Basing.

THERE was an old man in a boat,
Who said, "I'm afloat! I'm afloat!"
When they said, "No, you ain't!"
He was ready to faint,
That unhappy old man in a boat.

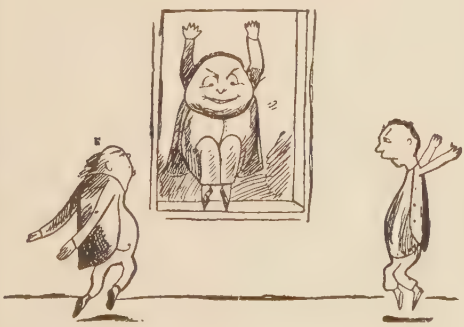
THERE was an old man of Nepaul,
From his horse had a terrible fall;
But, though split quite in two,
By some very strong glue,
They mended that man of Nepaul.

THERE was an old man with a flute,
A sarpint ran into his boot;
But he played day and night,
Till the sarpint took fright,
And avoided that man with a flute.

THERE was a young lady of Russia,
Who screamed so that no one could hush her;
Her screams were extreme,
No one heard such a scream,
As was screamed by that lady of Russia.

THERE was an old man on some rocks,
Who shut his wife up in a box;
When she said, "Let me out,"
He exclaimed, "Without doubt,
You will pass all your life in that box."

THERE was an old person of Dover,
Who rushed through a field of blue clover;
But some very large bees
Stung his nose and his knees,
So he very soon went back to Dover.

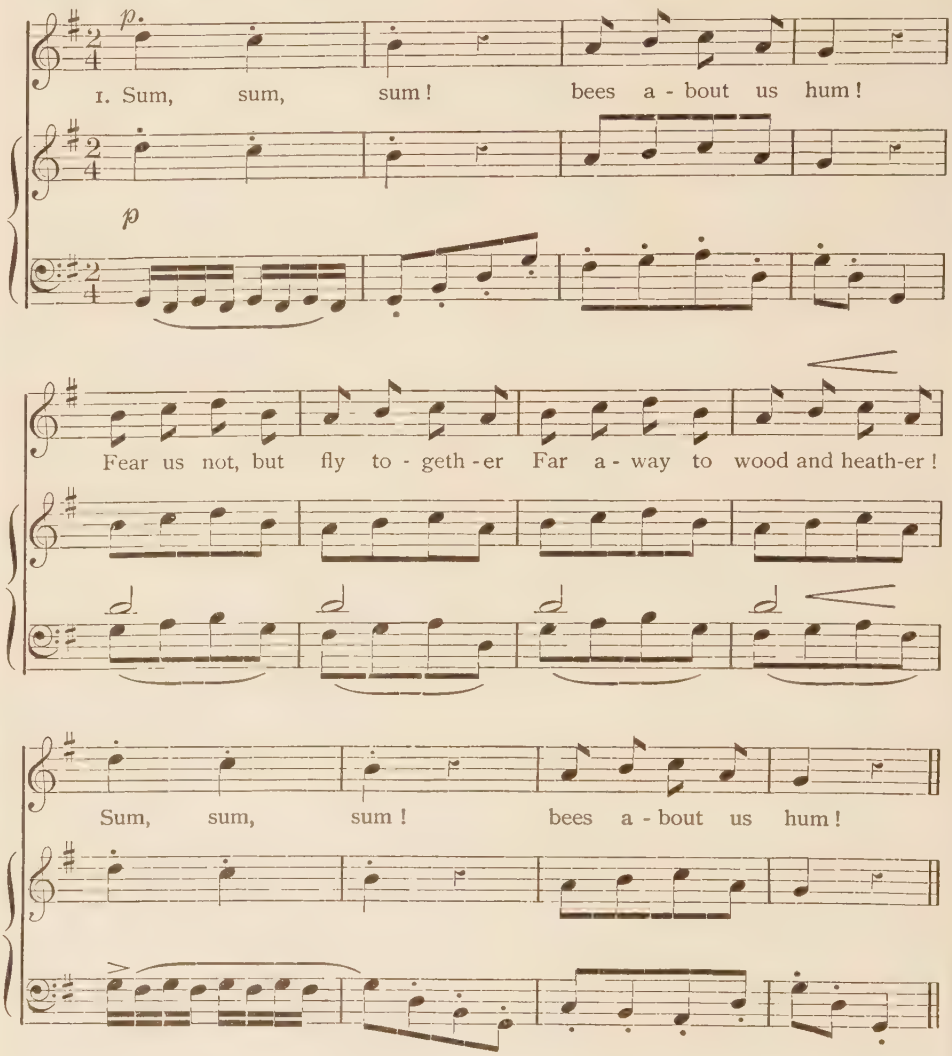


THERE was an old man at a casement,
Who held up his hands in amazement;
When they said, "Sir, you'll fall!"
He replied, "Not at all!"
That incipient old man at a casement.

THERE was an old person of Chili,
Whose conduct was painfully silly;
He sat on the stairs,
Eating apples and pears,
That imprudent old person of Chili.

THE BEES

Moderately

Music by permission of MESSRS. SCHOTT & Co. Words by ALFRED P. GRAVES.

2. Sum, sum, sum! bees to business come!
You this flow'ret, you this flower,
Drain of dew, for pollen scour!
Sum, sum, sum! bees to business come!

3. Sum, sum, sum! bees now cease your hum!
Hiveward with your spoil come sailing,
Sweets to store for our regaling!
Sum, sum, sum! bees now cease your hum!

4. Sum, sum, sum! bees about us hum!
When the Christmas-tree is lit up
Through its flowers you'll seem to flit up!
Sum, sum, sum! bees about us hum!

5. Sum, sum, sum! bees about us hum!
Then the tapers bright will show you
All the honey-cakes we owe you!
Sum, sum, sum! while for joy you hum!

The inside of a large rock-salt mine at Northwich, in Cheshire, illuminated by electric light.

WHERE DOES SALT COME FROM?

CONTINUED FROM 3865

THIS question may mean various things. Most of that which we call earth and rock consists of salts of different kinds, especially salts of such metals as calcium, aluminium, sodium, and potassium. These salts were formed ages ago by the burning or combining of these elements with oxygen and others.

But when we speak of "salt" we usually mean common salt, which chemists call sodium chloride, and which is a compound of the metal sodium with the non-metal chlorine. Sodium and chlorine have a very strong attraction for each other, and the salt in earth and water must have been formed almost as soon as any natural compound.

Salt is extremely soluble—that is, melt-able—in water; and so the greater part of the world's salt is to be found in the sea. But great deposits of salt, called rock-salt, are also to be found on dry land. These have been formed by evaporation of salt water at some time when the sea was retreating from what is now dry land. What happened was that the sun sucked up the water of the sea into the air, but the salt which men now dig up out of the salt-mines was left behind.

WHAT IS THE CAUSE OF QUICKSANDS?

Quick is really an extremely old word which means living, or moving. These words, living and moving, were thought to mean practically the same thing long ago. A quicksand is a bank of sand in water; perhaps in the sea, or a lake, or a river, or we may even meet a quicksand when we dig in the earth. The sand moves with the water which is around or in it, and thus a person or a boat that is caught in such a sand may be gradually drawn down into it, as the water, and some of the sand with it, sinks.

The famous Goodwin Sands, once an island, may be quite firm and dry in parts for some hours, but when covered by the sea they shift and become quicksands. In this state they are terribly dangerous to vessels that get caught upon them. The weight of the moving sand is tremendous and irresistible. We must not think of it as sticky. It is simply the weight and the movement of it that give it its terrible power. Some 200 years ago thirteen warships were lost in one night by the power of these treacherous quicksands.

WHAT IS THE PULSE?

Most of us have seen the doctor place his fingers on a wrist, and have heard someone say that he was feeling the pulse. Perhaps when he has gone we have tried ourselves to see if we could feel anything particular there, but unless we know exactly where to feel we may not have discovered it. If, however, we hit upon the exact spot, we should feel something

throbbing just underneath the skin, just a little tube expanding and contracting seventy or eighty times a minute.

As a matter of fact, that is just what the pulse is, and that is what happens. It is a wave of blood which is being sent along an artery by the force of the beating of the heart, and as the wave is confined inside this vessel or artery, which was already full of blood, the artery has to dilate or expand in order to receive the blood which is being pumped into it. Each time this happens we feel the throb, so that by feeling our pulse, and counting how often it beats or expands in a minute, the doctor can find out how often our heart is beating in the same time, because each throb of the pulse corresponds to a beat of the heart. We should understand, however, that the pulsating movement is not only to be found at the wrist; it occurs in every artery all over the body.

HOW CAN DOCTORS TELL OUR TEMPERATURE BY FEELING OUR PULSE?

The rate at which the pulse beats and the height of the temperature in the body have a distinct connection with each other, and go more or less together, so that when the doctor counts the pulse rate, and finds that it is just the rate it should be, he expects also to find the temperature quite usual. If, however, he finds that the pulse is twice as rapid as usual, he will also probably find that the temperature is much higher than normal, because the thing that causes the one to become rapid causes the other to go up. Thus, in all cases of fever, where there is some poisonous substance in the body, this substance causes the heart to beat quickly, and the pulse to become rapid, and it also causes a disturbance in that part of the brain controlling the temperature, so that both the pulse and the temperature are thrown out of gear.

WHY ARE SOME DISEASES INFECTIOUS AND NOT OTHERS?

If we had asked this question a hundred years ago, not even the wisest men could have answered it; but we know now that what we call infection is due to the presence of a vast number of very tiny living cells called germs, or microbes, or bacteria. These little creatures are so small that it requires very high magnifying powers in a microscope to see them, but it is by their action on the living tissues of plants and animals that many diseases are produced. These germs are so small, and so light, that they can be carried about in the air and breathed out from our lungs, so that they may contaminate the atmosphere or our food, and so spread disease wherever they go. That is what is meant by carrying infection. Thus the germs which cause typhoid fever or diphtheria often get into a milk supply or a water supply, and so cause an epidemic amongst all the people who use that source of water or milk.

There are many diseases which are not infectious, because they are not caused by these germs. For instance, many diseases are due to various forms of violence and pressure. This may be caused by lack of blood, or by blood being stopped from circulating properly. Still other diseases are due to various chemical substances which act as poisons upon the tissues of the body, while others are the result of extremes of heat and cold.

But all these concern only the individual to which they apply at the time, and are not capable of being transmitted to somebody else, as are the diseases caused by living creatures.

WHAT CAUSES CRAMP?

Cramp is really a spasm or contraction of a whole limb, or sometimes only of one or two muscles in a limb, or in the body. It may be very painful, or may be present along with numbness. We have, perhaps, often felt a sudden pain in playing some game or other when we are seized with cramp in a muscle, and this pain has, perhaps, passed off after a little vigorous rubbing. It may also be caused by over-exertion and severe cold, and is probably due to some complicated change occurring in the muscle itself.

A sharp rubbing over the surface of the muscle will usually put it right; but if we should happen to be seized with cramp when swimming, we can easily understand that it is very dangerous, because we must get to land before the cramp can be treated, and the fact that we have been seized with cramp might prevent us doing so. This is one of the reasons why it is dangerous to stay too long in cold water when bathing, or to go beyond our depth.

WHY DOES MANURE MAKE PLANTS GROW FASTER?

Do we know what growing is? It is a very wonderful and complicated process which takes place in both plants and animals, and depends upon proper kinds of food, and sufficient quantities of it, being supplied to these living things. If plants are neglected, or if children are half starved, they grow up puny and weak and ill-formed, and the way to prevent that is to supply them with plenty of good food and fresh air. But, in addition, every kind of living tissue has a special kind of food which suits it better than anything else, and the more it gets of this kind of food the more perfectly it grows. What we usually call manure is more or less decayed stuff—the bodies of other plants or other animals that have died.

This is just the food which is more nutritious than any other for plants and crops, so when the gardener or the farmer wants to grow his plants or his crops as quickly as possible, and to get the best he can, he finds out what kind of foods suit them best, and these he gives them in the form of manure. Nowadays there are many kinds of specially prepared substances which act in this way, and scientific men, by discovering these special foods, have shown us how to grow plants and crops in soils in which they would not grow before.

WHY DOES A TRAIN NOT RUN OFF THE LINES WHEN ROUNDING CURVES?

This is a very wise question, because it assumes the truth of Newton's first law of motion. That law says that a moving thing tends to go on moving in the same direction, and, indeed, must do so, unless something alters it. It follows from this law that the train going round a curve must run off the lines unless some forces are brought to bear that will alter its direction.

As we know, trains can be made to run round curves. We simply have to find out what the arrangements are which interfere with the tendency to move straight. We first think of the flanges on the wheels, but these are of small importance. If there were nothing else, the train would ride off the rails in a moment. The next point is the way in which the wheels are cut, as we can see on page 918; and, finally, there is a most important arrangement by which the outer rail on a curve is raised. When the railway is made, men have to calculate how sharp the curve is, at what rate trains are permitted to go round it, and then they have to raise the outer rail in proportion. We see just the same thing on a cycle-racing track, which is banked at the curves. The resistance offered by having to go uphill, so to speak, keeps the train in the path we desire. We are opposing the force of gravity to the tendency of the train to move straight on.

HOW IS IT THAT THE FOG DEADENS SOUND?

The intensity of sound varies according to the law of physics, which is equally true for light, for heat, and for gravitation, as well as sound. This law states that the intensity varies inversely according to the distance, so that the further off the sound is the less audible is it; but that is not the only thing which causes the intensity of a sound to vary. The second condition is the density of the medium through which the sound is transmitted. For instance, no doubt we have noticed how clearly we can hear sounds on a frosty night, and the reason is that the air is more dense and transmits the sound more readily.

On the other hand, if a gun is fired on a mountain of a very great height, where the air is extremely rarefied, the sound is no greater than that of a toy pistol under ordinary circumstances. Now, in the case of a fog, the solid particles in the air may affect the transmission of the waves of sound, but the main thing which influences the intensity of any sound is the density of the atmosphere.

WHAT ARE CORNS?

A corn is a hard growth which occurs on the toes or some other part of the feet, and is generally the result of wearing a shoe too small for the foot. The corn itself is composed of the outer part of the skin, and the overgrowth of this skin in a lump, which produces the corn, is caused by the pressure of the boot at the spot. But the corn would not result unless the pressure was taken off at intervals, and this, of course, is done when we take the boot off. If the pressure were kept applied to this spot all the time continuously, the skin, instead of overgrowing at that point, would waste away. It was

once the custom in China to place a very tight bandage round the feet of the ladies, and this was kept on always, with the result that the feet did not grow to their proper size. So that the result of the pressure on the skin depends entirely upon whether it is continuous, and whether it is severe. The overgrowth of the skin is due to the irritation produced by the pressure.

WHAT ARE FRECKLES?

What we usually speak of as freckles are spots of a yellowish-brown colour which are seen on the skin of some people, especially after they have been exposed to strong sunshine for some time. They occur chiefly on the face, on the neck, and on the hands, because those are the parts of the skin unprotected by clothes. Some people are much more liable than others to have this colouring produced, and in some it disappears quite quickly, while in others it lasts a long time.

In all these cases the freckles are the result of the action of the sun on certain cells of the skin, which causes these cells to produce colouring matter, or pigment, which remains there for a certain time. There are cases, however, in which freckles do not appear to be caused by very hot sunshine or exposure, but which come naturally, just as the colour of the skin itself is either fair or dark, according to the tendency inherited by the individual.

WHY DOES ANYTHING PUT ABOVE A FLAME ATTRACT IT?

The direction a flame takes depends entirely on the currents of the air moving around it. If the flame is burning in a still atmosphere it points straight upwards, because the hot air above it is lighter than the colder air below, and so tends to rise and make a draught upwards in the direction of the flame which has to be filled up by the cold air beneath. Now, if we hold, say, a key above such a flame, this process is made more marked because the hot air is turned aside by the key, and so makes a stronger draught, the current of which points to the centre of the key. The air at that spot is hottest, and rises very rapidly, and the hotter it is the stronger is the draught in that direction. Therefore, the point of the flame is attracted to that spot.

WHY DOES NOT THE WATER FALL OUT OF A QUICKLY REVOLVING PAIL?

We must remember that every substance, whether it be a solid or liquid, tends to remain in the same position unless some force is applied to it to move it. The force of gravity keeps the water in the bucket when the bucket is at rest, and attracts both the bucket and the water to the earth. When we swing the bucket over our heads, gravity would cause the water to fall out if we held the bucket still, but by keeping it moving we bring other forces into action which act in other directions, and tend to make the water press against the sides of the bucket.

If the water could get out it would not fall straight down to the earth, but would go on some distance in the direction in which the bucket was moving at the moment, and would gradually come to the earth. So that the water stays in the bucket as the result of the several different forces acting upon it while it is being swung quickly round and round.

WHY DOES A BEE DIE WHEN ITS STING COMES OUT?

What we call the sting of a bee is not really meant to be used as a sting. It really exists to help the bee lay its eggs, and when the bee uses the sting, as we call it, it is roughly torn away from the bee's body, causing damage which is usually fatal. This is a very curious case where part of an animal's body has had its real purpose changed; but the change has required a heavy cost, for the sting cannot be used except at the risk of the bee's life.

This means that to use its sting is an act of suicide on the part of the bee, and if a bee lived for itself, this would indeed be a foolish means of protection. But every bee lives for the hive, and the real use of the sting is not to attack us, for instance, when we hit at a bee with a handkerchief, but to protect the beehive from its enemies. The bee's sting is not a weapon of offence, but of defence—not self-defence, but hive-defence. It is used only under provocation, and only for the sake of others and the future of the bee race. The bees that sting do not themselves lay eggs, and so it is that they are able to turn this part of their body to quite a new and utterly unselfish purpose.

THE PLANT AS A PATTERN-MAKER

THE LEAF ARRANGEMENT OF WOOD-SPURGE

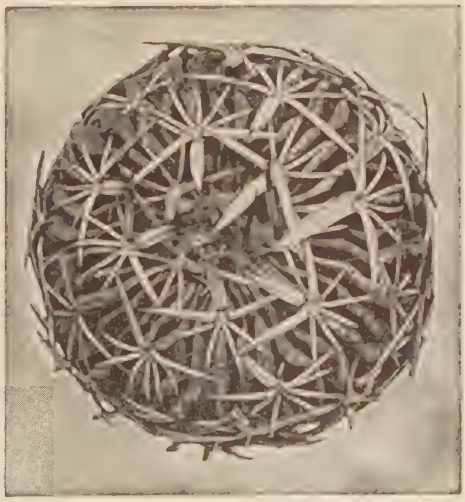
A PRETTY STAR-PATTERN OF THISTLE LEAVES

THE HOUSE-LEEK AS A ROSETTE

HAIRS ON A CACTUS

THE SEA-URCHIN CACTUS

SOW-THISTLE'S LEAVES ARRANGED AS A STAR



A CACTUS STUDDED WITH PRICKLY STARS

We all know what beautiful and varied designs are traced by Nature when she is making crystals like the snow flakes, and forming some of the creatures that live in the sea, like anemones and starfish, as we see on page 2337. But it is not only in the animal and mineral kingdoms that Nature is a pattern-maker. Many plants, as they grow, form pretty and regular designs with their leaves, and here we see some striking vegetable stars and rosettes.

IS IT TRUE THAT THERE IS THE SIGN OF A LOST EYE ON OUR BRAIN?

It is quite true that there is a part of the brain which is supposed by very learned men, who have studied the brains of all kinds of animals, to represent an eye which occupied the position of the middle line of the head right in the centre. This structure is still present in animals to-day, and even in man himself, although it no longer has any function belonging to sight. But, curiously enough, there is still existing in the far-off country of New Zealand a lizard whose proper name is sphenodon, in which this central eye is so near the surface that it can still be affected by the rays of light.

This curious creature seems to be the only remaining animal in the world in which this eye exists. It is thought, therefore, that some animals had originally one eye in the middle, and that as they evolved into more complex creatures the one eye has become separated into two, a right and a left eye.

WHY CAN ONE HEAR A WHISPER ACROSS THE DOME OF ST. PAUL'S?

Perhaps we have often noticed, when we have been in different buildings listening to somebody speaking, either at a lecture or in a church, that it is sometimes much easier to hear the speaker than at other times, and that this does not seem to depend upon the size of the building. In fact, in some very large buildings it is very easy to hear perfectly, and in some quite small buildings it is extremely difficult.

It all depends upon the shape and arrangement of the walls in relation to the sound-waves which have to come to our ears before we can hear anything. Now, in the dome of St. Paul's, London, the construction of it is such that the sound-waves which are set up even by a whisper are so controlled that a person standing at a distance can hear them distinctly. It is a mere matter of directing and controlling waves of sound so that they are not dispersed, and that is why we hear them.

DO WE ALWAYS WAKE WHEN WE HAVE HAD AS MUCH SLEEP AS WE WANT?

This is an extremely important question, because the answer to it must decide one of the most essential points in taking care of children. At one time, the view used to be held that children were naturally lazy and naughty, and that Nature in general had done things so badly that, to give the children a chance, it was necessary for grown-up people to interfere with everything that the little ones inclined to do. On this theory, the children were awakened at a fixed hour, as if all children required the same amount of sleep, as if the same child always required the same amount of sleep every night, and as if all sleep were of the same quality, and so could be measured by hours. This was all wrong.

People who really know—because they have given their lives to studying the subject—are certain that a child will wake when its brain has had all the sleep it needs. The waking is the proper fruit of the sleep. A child could not sleep too long, because directly sleep has done its work the brain must wake; that is what sleep is for. On the other hand, the slightest noise may awaken children before they have had their sleep out, and then grown-up people call them cross and naughty, and say they have got out of bed the wrong side, and all that sort of nonsense. It is only a few children that get all the sleep that Nature asks for them, and it is believed that a large number of these children afterwards become the leaders of their generation.

WHAT MAKES NOISE, AND CAN IT BE HEARD WHERE THERE IS NO AIR?

What we call noise is all those kinds of sound which have no musical quality. They are not musical because they consist of waves in the air which are not regular, but which just come "anyhow" against the ear.

We usually speak of sound as a wave in the air, because that is what it generally is. Certainly it cannot be heard where there is no air, if by "no air" we mean a vacuum—a space from which the air has been removed as far as possible. But the waves that make sound can be carried through other gases besides those that make up air, or through liquids or solids. Sound travels quite readily, for instance, through water. We know only too well that it travels through solids for shut windows do not exclude the sound of the streets from our ears, though they make the sound less. This means that the wave movement of the air outside the window is communicated to the glass, and then by the glass to the air inside the room.

The glass cuts off some of the sound, because a certain amount of power is lost in transferring the wave from one medium, as we say, to the other.

Though noise and sound in general can be conveyed through any kind of matter, whether solid, liquid, or gaseous, what we call the ether cannot convey sound. Thus there can be no sound in the depths of space, and not the greatest noise made in the sun could ever reach the earth. On the other hand, *nothing but* the ether can convey light.

HAVE THINGS GOT COLOUR AT NIGHT?

Of course a thing has colour at night, or at any other time if it gives out colour of its own, as a fire or a gas-jet does. The things that give out light of their own we call luminous. The question really is: Have things that are not luminous got colour at night? Now, when we say colour we mean coloured light, light of such a kind that it gives us a feeling which we call colour. If there is no light there is no colour. Even a non-luminous thing may have colour at night if there is light in the room. So now we can put the question in the exact and proper way—Have non-luminous things got colour in the dark?

The answer to that question is: Certainly not. An orange is yellow because when yellow light, or white light containing yellow light, is thrown upon it, it has the power of throwing the yellow light back to our eyes, and so we call it yellow. If no light falls upon it, it can throw no light back, as, unlike the fire, it produces no light of its own; and so, of course, it has no colour in the dark, nor has anything else that does not produce light of its own; and if it did produce light it would not be in the dark. In a word, what we call colour is a kind of light, and where there is no light there can be no colour.

WHY DOES THUNDER TURN MILK SOUR?

Thunder, we know, is a disturbance of the air which we hear as noise, and which is made by the passage of electricity, which we call lightning, through the air. This noise in the air does not turn milk sour, so directly we think what we really mean by thunder, we see that the question has not been put quite in the right way. All the same, we know that, at times when it thunders, milk very quickly turns sour; and though we see, of course, that the thunder does not turn the milk sour, we must find out what it is that does. The answer is that there is something in the state of the air in thundery weather which affects the milk, and this it does whether we happen to hear thunder or not. The air in thundery weather is charged with electricity; that is a very vague phrase, but we really cannot make it more precise yet. It is also, as a rule, very moist and very warm. These three conditions, especially the presence of the electricity and the warmth, greatly favour what goes on when milk turns sour. And that is why milk keeps such a short time in thundery weather.

WHAT ARE OUR EYES MADE OF?

In another part of this book we learn how our eyes are built, but this question about the stuff of which they are built is well worth answering. If we could take an eye to pieces, and sort out all the different things of which it is made, we should find that, like the body in general, a great part of it was made of water, certainly not less than four-fifths of it. Besides water we should find the various elements that go to make up living matter, or protoplasm. In the eye we find many kinds of cells which consist of protoplasm, and others, such as the cells of the lens of the eye, which, though they were made by protoplasm, consist of something else quite peculiar to themselves.

But in the curtain of the eye we should find the protoplasm mainly in the form of nerve-cells, and if we trace back the development of the eye, we find that the most important part of it—the part which really makes it an eye—has grown out from the brain, and is really a little part of the brain pushed forward. Part of the front of the eye is really skin that has been changed for the purposes of an eye, but the part that really makes the eye an eye is just as certainly part of the brain, when we come to know its history, as the rest of the eye is part of the skin.

DOES IRON OR STEEL GET TIRED?

When we speak of anything getting tired, we naturally think of a living creature, such as ourselves. We know that we, when we are not tired, can do certain things, but when we are tired, some change has occurred inside our bodies that prevents us from doing

those things. The proper word for this state is fatigue. Now, if we take a piece of steel like a razor, which can do certain things, such as cut very sharply, and if we overwork it—as we should say if we were talking of a horse—we may find that it will not cut as it used to do, however carefully we prepare its edge. Something has happened to it which prevents it from doing what it was able to do before. We are quite entitled to call this "getting tired," as we do in the very similar case of ourselves.

The fatigue of metals, as it is called, is now a well-known fact, to the study of which at least one well-known student has devoted much of his life. It may be of very great importance at times in the use of tools and machinery, as anyone may guess who finds that his razor needs a rest. But the fatigue of metals is also very interesting in another way, especially when we begin to learn how it depends upon changes in the way in which the molecules of the steel are joined to each other. For it may be that, if we could learn fully about the causes of tiredness and the cures of tiredness in razors, and things like that, we might better understand fatigue in ourselves, how to prevent it and how to cure it.

WHY ARE THERE TWO TIDES A DAY?

This is a very puzzling question, to which very few people know the answer. The earth only spins round once in a day, and the moon pulls the water up towards itself on the side of the earth next the moon, making what we call high tide. Anyone would think, then, that there must be only one high tide a day. But the moon not only pulls up and heaps up toward itself the water on the side of the earth that is next it at any given moment; it also pulls the earth towards itself away from the water on the other side of the earth, the side farthest from the moon.

The moon attracts the earth more powerfully than the water on the far side of the earth, since that water is farther away from the moon. So when it is high tide anywhere, it is also high tide on the other side of the earth. This must mean that we get two high tides in twenty-four hours.

The first of them, perhaps, is due to the moon heaping up the water on the side of the earth next it—the side of the earth where we are. But twelve hours later the earth has spun round so that we are on the side away from the moon, and now the moon is pulling the earth towards itself more strongly than it is pulling the water, so the water where we are is heaped up again, and that, of course, makes the *second* high tide we have in the twenty-four hours.

DID MAN ALWAYS TALK?

We can only give a *probable* answer to a question like this, for evidently we have no certain way of finding out the answer. Some people have supposed that there must have been a time when man did not talk, and so they have given a special name to men of that period. But we may be almost sure that they are wrong. The lowest kinds of human beings now living certainly talk; but they are much higher than the first men were, no doubt.

We know that the highest kinds of apes have a sort of language, and that makes it probable that the earliest men had a language too. Indeed, many people think that language, or speech, is exactly the thing that makes man, and that mankind, therefore, when he appeared on the earth, was able to speak, and that men have always been beings that could talk. Another way of saying this is that we could not call beings human who had not the power of speech in some form or other. Such beings could not teach each other from generation to generation as human beings do, and, in a word, they would only be animals, to say the best of them.

DID MAN ALWAYS WRITE?

Writing is a form of speech, only written instead of spoken. But it is very much more difficult to learn, as we all know; and if we think for a moment, we shall see that it must have been vastly more difficult to invent. Indeed, a simple kind of speech scarcely required invention at all, for it could grow out of mere noises that meant pleasure, or anger, or distress. But writing requires invention. It needs people to agree with one another that certain marks shall mean certain things; and this is true even though we know that writing grew out of simple pictures of things like the eye, or a man standing that anyone could recognise.

We do not think there can be any doubt that, just as we all can talk and understand what other people say long

before we can write, so mankind could talk long before writing was invented. We have evidence of the existence of human beings who have left us rude pictures scratched on bones, for instance, but no signs at all of any kind of writing. Indeed, "man before writing" was, until lately, supposed to have lived in Europe not many thousands of years ago; and though we now know that writing goes back much farther than we used to think, we can guess fairly well about the time that it was invented. It was easily the most wonderful invention of all time.

WHY DOES HEAT MAKE PAPER CURL UP?

There is a certain amount of water in all ordinary things. The amount of water in a sheet of paper makes it heavy. We know how heavy and limp a piece of quite damp paper is. If we heat the paper, we drive the water away, because we change it into a gas that passes off into the air. Spaces in the paper that were filled with water before are now filled with air, which is very much lighter. If there are any forces in the paper tending to make it curl up, they are now free to act, for they have not to lift the weight of the water that was previously in the paper.

Also, we must remember that paper, like almost everything else, shrinks, or contracts, when it is cooled, and expands, or takes up more room, when it is heated. If the change in temperature occurs at exactly the same rate in every part of a thing, then, as its size alters, its shape will not alter; but if one side of a thing gets hot or cold at a slightly different rate from the other side of it, then its shape will change, and if it is a thin, flat thing we shall notice the change by finding it curl up.

WHY DO THE WAVES CURL OVER AND BREAK?

If the question had been "Why is a man who steps off a moving train likely to fall on his nose?" the answer would have been just the same as to this question. The man's body is all moving as he steps off the train. But when his feet touch the platform, their motion is stopped—unless he is careful and at once runs quickly enough. The rest of his body goes on moving, however, and as his feet are left behind, he will topple over and fall, even if he does not break up like the waves. In the same way, when the wave reaches the shore, its feet, so to speak, are caught and held back by rubbing against the sand or shingle; but the rest of the wave moves on, and so it topples over and breaks.

WHY DO TREES GROW TO A CERTAIN HEIGHT AND THEN STOP?

Well, we might ask the same question of men, or horses, or birds, or any other living creature, as of trees. The reason is that the growth of living things is not like the growth of a snowball or a crystal. Such things simply go on growing the more "food" they get. There is nothing inside them limiting their growth. But every living creature has the marks within it of something that has a purpose—which snowballs and crystals have not—and that purpose is simply *to live*. In general we may say that living things grow to the size which suits them best, and so favours their life best; when that is done, they stop growing, and merely maintain themselves as long as they can. We have to think of every living creature as if it had a plan, a definite course of action which it had resolved upon, and which it will pursue if the conditions outside allow it to do so. It grows to the shape and the size which it is *meant* to grow to, and then no powers on earth, no amount of food and air and light, will make it grow even the least little bit more.

WHAT MAKES A LEAD PENCIL WRITE?

If a "lead" pencil were made of lead, or almost any other metal, it would not write. Nearly all metals are too hard to rub away against paper sufficiently for us to notice any marks; and there are no metals whose colour would show well against paper. A "lead" pencil is made of a vast number of tiny crystals of carbon. This form of carbon is called graphite, from the Greek word for writing. The crystals are small, and of such a shape that they can easily be rubbed away from each other.

If there were no such thing as friction, the pencil would not write. The power of friction, or rubbing, depends upon the force with which the rubbing surfaces are pressed against each other; so the firmer and harder we press with our pencil, the more graphite is rubbed down by friction on to the page to record the track of our "lead" pencil.

The next Questions are on page 4113.

SAVONAROLA'S FAMOUS BONFIRE OF VANITIES IN FLORENCE

The power of Savonarola in Florence grew until it became greater than that of the rulers of Florence, and huge wooden galleries were set up in San Marco to hold the crowds that thronged the cathedral. Under his influence the people resolved to burn their vanities, and this picture by Mr. F. W. Topham shows the burning of their "vain and unholy things."

SOME FAMOUS MONKS

CONTINUED FROM 3912

A WAR has long been waged on the subject of monks and monasteries. It is one of those subjects on which people make themselves hot and occasionally bang the table with their fists. In America monasteries do not flourish with great success. American people, speaking generally, are not inclined toward the cloister so much as some other nations. It is not their way to shut themselves up from the world; they prefer a more active life. The American takes more kindly to making steam-engines, or alarm-clocks, or a fortune, than to sitting still in a rapt contemplation.

But the monk is a picturesque figure. He reminds a world too easily vulgar, too easily satisfied with the frolic of vanity fair, that life carries an immense responsibility. He is one of the texts of Christ in human form: "What shall it profit a man if he gain the whole world and lose his own soul?" There is more than one way of reading this text, but the monk is at least one rendering of it. He reminds us that, in comparison with eternity, man's life is but a shadow.

There have been bad men in monasteries as well as saints. But chiefly, perhaps, they have been filled with good, quiet, commonplace men, to whom the struggle of life presented either a dull or a terrifying aspect. Here and there the records are lighted up by daring, defiant, or revolutionary and heroic figures, who seem to snatch the falling time in which they lived from the flames of destruction, and valiantly to thrust the world forward on its march of progress. One monk, as we shall see—and he was an Englishman—was the first voice lifted up for science after a silence of fifteen centuries.

Let us begin with the most curious of all monks—and hardly meet to be called a monk—the famous Athanasius. A little man, radiant with intelligence, possessing "the face of an angel," according to Gregory, Athanasius was said to be "quick in sympathy, pleasant in conversation, and still more pleasant in temper, effective alike in discourse or in action, assiduous in devotions, helpful to Christians of every class and age, a theologian with the speculative, a comforter of the afflicted, a staff of the aged, a guide of the young." At the age of thirty he was called to be Bishop of Alexandria. In those days a great controversy tore the Church, and the struggle became at last "the whole world against Athanasius,

and Athanasius against it." Again and again he was driven from his bishopric; again and again he returned. Once soldiers rushed in to take him at the altar. He showed no fear. This devoted son of the Church spent the periods of his exile in monasteries, and, during those weeks of quiet, wrote some memorable books. He was not a true monk, being more of a statesman than a parish priest; but his devotion to his ideas concerning Christ were of the most devout and sacred kind, and we owe it to the monasteries in Upper Egypt that some of those ideas have come down to us. Born about 296, Athanasius died in 373.

How a child's voice made a bishop in a city crowd

Of all the monks who ever lived, if he can properly be called a monk at all, the strangest is St. Ambrose. At the age of thirty-six, after a successful life as a lawyer, he became a governor, and lived in Milan. A dispute arose between two sects of the Church over the election of a bishop. There was a dispute in the church that was almost a war Ambrose hurried to the scene, and made an earnest and eloquent appeal to the people for Christian behaviour. As he ceased speaking—so says the legend—an infant's voice suddenly cried out: "Ambrose is bishop."

The crowd took up the shout. In vain did Ambrose protest that he was a bad man and not fit at all to be a bishop; in vain did he try to escape. The whole city insisted, and the lawyer and governor, selling his goods and putting by his robes of state, became a Christian bishop. The day came when he showed his spirit. The powerful Emperor Theodosius ordered a massacre, and the slaughter had been carried out. Ambrose, shocked to the soul by this bloodthirsty outrage, wrote to the emperor, refusing to let him enter the church of Milan.

The fearless Ambrose, who made an emperor do penance

The emperor replied that David had committed murder. "Imitate him in his repentance as well as his sin," answered the heroic bishop. For eight months the bishop kept the emperor at bay. Then, one day, the emperor's courtiers came to Ambrose and announced that the emperor was coming. "I will hinder him from entering the vestibule," said Ambrose; "yet, if he will play the king, I will offer him my throat." When the emperor heard this, he said: "I will go and receive the refusal which I desire." But on meeting the bishop he said: "I come to offer myself to submit to whatever you may prescribe."

Ambrose then commanded him to do public penance, and in future—because his temper was ungovernable—to let thirty days run between the order for capital punishment and its execution. Ambrose was a just, fearless, and upright man, and his writings are those of a devout and fervent worshipper of God. Born about 340, Ambrose died in 397.

St. Jerome is interesting to us as the Latin translator of the Scriptures. He is also interesting by reason of the picture he presents to us of a man fighting what he considered a dreadful sin, namely, a love of books. Poor Jerome was a scholar, and he loved old books, and he could only be happy with venerable authors full of tales of long ago. But a day came when, brought by sickness to death's door, he reflected on the next world, and came to the conclusion that pagan literature was wicked.

Jerome, the monk who loved books and fled to the wilderness

Before this time he had been a man who loved to take part in arguments about the Church; now he became a man who wanted to live the Christ-life. He became a hermit, and lived in the wilderness. But in the wilderness there were books in a monastery there, and soon he was among his temptations again; he again became mixed up in violent arguments. Called to Rome to help in a dispute, he became a great favourite with ladies, and when he set out to the Holy Land, he was followed by a train of these admirers. They built three nunneries and a monastery, and Jerome settled down in this monastery at Bethlehem to write the Old Testament in Latin. Jewish Rabbis came to him by night to help him in his work.

But whenever an argument broke out in Rome, off flew Jerome eagerly, for he simply could not keep himself out of an altercation. He was like an Irishman, always spoiling for a fight. So violent was his manner that the monastery in which he stayed was attacked by furious enemies. To the end of his life Jerome

TWO MONKS WHO FACED GREAT DANGERS

St. Boniface, an English monk who carried Christianity to the heathen nations of Germany, braved many dangers in seeking to win these people for the truth. To prove that their gods were no gods, he undertook to destroy the sacred oak of Geismar, and here we see him full of zeal, chopping down the tree before the heathen priests.

St. Ambrose was a lawyer, but his gentle and wise behaviour was so appreciated that the people insisted he should be made a bishop. For a long time he refused the honour, but finally accepted. When the Emperor Theodosius presented himself at the door of Milan church, after he had caused a cruel massacre in Greece, Ambrose refused him admission, as shown here, and only withdrew the prohibition after a long penance by the emperor.

The upper picture is reproduced by permission of Messrs. Jäger and Gorgen, Munich, and that of Ambrose by permission of Franz Hanfstaengl,

was a scholar and a disputant. No wilderness and no monastery could ever have held this worthy man without books. He was a good man, and deserved his sainthood. Jerome was born about 342 and died in 420.

THE ENGLISH MONK WHO TOOK CHRISTIANITY TO GERMANY

It was a monk from England who, in the eighth century, carried Christianity to Germany. His name was Winfrid, and he was born probably at Kirton or Crediton, in Devonshire, the son of a West Saxon chieftain. At seven years he was sent to a monastery school in Exeter. The Pope saw him in Rome, took a fancy to him, gave him permission to go as missionary to the Germans, and changed his name to Boniface.

We get a quaint picture of the period in the scene which took place between Boniface and the heathen of Germany to decide between God and Woden. Boniface undertook to chop down their sacred oak. The heathen, thinking he would infallibly be struck down by their wrathful god, stood by to watch his destruction. The oak fell with a crash; Boniface did not. Whereupon the heathen embraced Christianity, and out of the oak Boniface built an oratory to St. Peter.

But alas for poor Boniface! He was himself destined not to end his days in peace. After a life of the most manifold and successful labours; after having converted thousands to Christianity, set up monasteries, built churches, and even crowned a king of France in the name of the Pope; after all this Boniface was attacked by a body of pagan plunderers, and, offering no resistance to their onslaught, won the glorious crown of martyrdom. The poor old man, frail and delicate, fell before the clubs of savage robbers, and died with his relics clasped in his hand. His life was one of the most useful, hazardous, and courageous ever lived by man, and England may be proud of her missionary. Boniface died in 755.

ST. BERNARD, WHO DENIED HIMSELF PLEASURE AND FOOD AND FRIENDSHIP

One of the most attractive monks in history is St. Bernard, called the "last of the fathers," so simple was he, so full of faith, so quiet of soul, so touched by the Spirit of Jesus. He was the son of a French knight, and as a boy drew others to the religious life. He became a Cistercian monk, and set himself to kill all sense of enjoyment, all desire for pleasure in his own soul. He seldom took food till he was on the edge of fainting, and when friends came he would stop his ears with flax so that he might hear no worldly talk. This was in his boyhood.

Some time later we hear him saying of book-learning: "You will find something far greater in the woods than in books. Stones and trees will teach what masters do not know. Think you not you can suck honey from the rock, and oil from the flinty rock? Do not the mountains drop sweetness, the hills run with milk and honey, and the valleys stand thick with corn?"

He lived the most hard and desolate life, preaching repentance with a rare eloquence. When he was fifty-five, and worn to a thread, he was bidden bestir Europe for a second crusade. Pale and shrunken, to a degree which seemed almost supernatural, he made a long and exhausting tour of France and Germany, preaching with a success so great that in some districts scarcely one man was left to seven women.

HOW THE GENTLE BERNARD SAVED THE JEWS FROM DEATH

Behind this old man came a young monk stirring people up to massacre the Jews. Bernard turned back, reproached the monk as "a child of the devil," and sent him to his monastery. "Had not the tender mercy of the Lord sent priest Bernard, none of us would have survived," said a Jew. That such a tender and beautiful life of fervid piety should have been lived in the twelfth century is a glory of Christianity. St. Bernard was born in 1091, and died in 1153.

One aspect of St. Bernard brings us in contact with another and far different monk of that period, the man Peter Abelard. He is not a pretty character. Possessed of a brain that used logic as a boy uses a top, he gave himself up to disputing about the most ridiculous things in the world. He passed for a scholar of immense learning. His fame spread. He became a peacock of philosophy, a dandy of theology. He went from town to town airing his knowledge and refuting other teachers. In the height of his fame he fell in love with a girl he was engaged to teach, and

THE TENDER ARTIST-MONK OF FLORENCE

One of the best-known painters of Italy was a monk named Fra Angelico, who lived for some years in the same monastery at Florence as Savonarola. He painted so as to inspire men to feelings of reverence and devotion, and one of his famous pictures is seen here standing on the easel, while the artist sits upon a stool by its side.

After a time the Pope sent for Fra Angelico to Rome, where he lived most of the last ten years of his life, painting pictures in the Vatican. Mr. Ruskin has said that Fra Angelico was able to express the sacred affections upon the human countenance as no one ever did before or since. Here we see Fra Angelico at his devotions

married this Héloïse secretly, lest he should be stopped from advancing in the Church. Then his enemies, stirred up by his pride, came about him. He was persecuted, and had on some occasions to flee for his life. He was accused of heresy. St. Bernard was set to dispute with him. The poor old faded monk was bidden to stand in conflict with this great "scholar."

We are told that, hearing the eloquence of St. Bernard, Abelard refused to argue, and appealed to Rome. Rome condemned him. He entered a monastery, sick of the world; his wife went into a nunnery. But his persecutions lasted almost to the day of his death. For Abelard condemned the wicked lives of the monks whose lot he shared, and these men made it hard for him. His reputation as a scholar, however, continued, but he was no longer the swaggering coxcomb seeking to dazzle and attract. He died a broken-hearted man, having spent his last years in writing rather cold and formal letters of religious instruction to his wife in the nunnery. Abelard lived from 1079 to 1142.

THE EXTRAORDINARY STORY OF ST. DOMINIC AND THE BLACK FRIARS

If every person who crosses Blackfriars Bridge in London knew how it came by that name, what a great multitude of people would know the extraordinary story of St. Dominic! The name comes to us from one of the most striking figures in the Roman Church—a Spanish priest known as St. Dominic. He began life with a beautiful and earnest devotion to Christ. As a boy he prayed often; at the university he sold his clothes in a time of famine to feed the poor, and offered to go as a slave to Morocco in place of a poor woman's brother who had been captured by the Moors. He was ordained a priest, and soon became known for the rigour of his life and the eloquence of his preaching. So far Dominic was an earnest son of the Church. But a day came when he went on a mission to Denmark, and no sooner had he left Spain, where the people feared and obeyed the priests, than he found himself among people of a vastly different character. Shocked by their disobedience, by their heresies, and by the manner of their life, Dominic set himself to reform or punish them.

Meeting a magnificent cavalcade from Rome on the same mission, he exclaimed: "How can you expect success with all this secular pomp! These men cannot be touched by words without corresponding deeds. Throw aside your splendour, and go forth as the disciples of old, barefoot, without purse or scrip, to proclaim the truth."

THE POOR MONK WHO FOUNDED THE DREADFUL INQUISITION

Dominic practised what he preached, and became a barefooted, black-robed, mendicant friar—a black friar—and set out to convert these disobedient children. But, alas! success did not attend his efforts, and he had to say at last: "I have spoken to you with tenderness, with prayers, with tears; but, according to the proverb of my country, where the benediction has no effect, the rod may have much. Behold how we rouse up against you princes and prelates, nations and kingdoms, and many shall perish by the sword!"

Enthusiasts claim for him the terrible responsibility of having set up the Holy Inquisition—that great organisation which tried and condemned men, women and children in the name of God. We see how a man, beginning with the purest saintliness, the most devout and simple piety, may become very harsh in the cause of righteousness. Dominic, apart from this Spanish zeal and intemperance, was a man of no little genius and much faith. He was born about 1170 and died in 1221.

ROGER BACON, THE ENGLISHMAN WHO WAS SAID TO KNOW EVERYTHING

A great scholar-monk was the English Roger Bacon—"the miracle of the age he lived in." He was said to know everything. He marks for us an interesting place in human history. From the days of Archimedes, about 300 B.C., to the days of Roger Bacon, about 1200, science is dumb. Fifteen centuries of silence! We shall never catch up those lost 1,500 years. Roger Bacon was the first man to break the long silence. This friar studied chemistry and astronomy. Under one Pope he was allowed to work unmolested. But soon his knowledge gave offence; he was cast into prison in France, and only came out to drag his weary way to England, where he soon died—one of many pioneers of science. Nowadays the man

who makes a discovery or an invention is much honoured. Hardly a person will condemn it, all show approval by using the telegraph wire, the railway train, the ocean steamer, and so on. Roger Bacon, who lived from 1214 to 1294, would have been glad to see this day.

THOMAS À KEMPIS, THE LITTLE MONK WHO WROTE A FAMOUS BOOK

Early in the fifteenth century, when Europe was in a state of the greatest confusion—England fighting France, while two Popes, existing at one and the same time, were making a havoc of Church government—there lived in a poverty-stricken monastery in Germany, earning bread for himself and his brother monks by copying religious books, a little man, with soft brown eyes, whose name was Thomas à Kempis.

That name was then quite unknown outside the monastery walls. To-day it is known in practically every language under the sun. The little monk knew nothing of the storm in the world; he was probably quite unconcerned as to whether the Pope at Rome or the Pope at Avignon triumphed in the struggle to be considered the Vicar of God. Such things did not seem to him of much importance. When he spoke of obedience, he did not think so much of temporal rulers and ecclesiastical superiors; he meant the obedience of "the lower part of man's nature to the higher, and of the whole to God."

He was a deeply religious, profoundly pious man, living a useful and contemplative life. The noise of cannon and the shouts of kings reached his ears like the sounds of children at play. This quiet and simple little man, besides copying other people's books, wrote some of his own. One of them, called "The Imitation of Christ," which he gave to the world without his name, tells the simple story of the soul in communion with its invisible destiny.

HOW THOMAS À KEMPIS MADE HIS NATIVE TOWN KNOWN TO ALL THE WORLD

But so sweet, so true, so natural, so golden with the breath of a loving, yearning soul is this little book of the little monk, that it has been translated into more languages than any other book in the world except, of course, the Bible.

Little did Thomas à Kempis imagine, while he wrote, that those words of his would become the heart-literature of Europe for centuries. He had been reared in a poor cottage, the son of overworked peasants, and his name of Thomas Hammerken had been changed at school to "Thomas from Kempen," Kempen being the name of the little town where his peasant mother had nursed him. How wonderful is it that this man has sent the name of that humble German town round the whole earth by just writing down, again and again, that he loved God and desired immortal life! Thomas à Kempis lived from 1379 to 1471.

A very famous monk, one of the men who helped to make Florence beautiful, is mentioned on page 2790 of this book. This is the painter known to all the world as Fra Angelico. In books his name is often given as Fiesole, or as Fra Angelico Fiesole. This may seem a little puzzling, but the explanation is simple. His name was Guido—we do not know his other name. When he became a monk, he had to forsake his own name, and take that of Giovanni. Giovanni is the Italian name for John. Whence, then, came the names Angelico and Fiesole? He was born at Fiesole, the little hamlet on the hill above Florence, and he was called the "angelic friar," because of his paintings of angels.

FRA ANGELICO, WHO LIVED A BEAUTIFUL LIFE & PAINTED BEAUTIFUL PICTURES

It was in 1387 that Fra Angelico was born, and when he was twenty years of age he entered the monastery at Fiesole, to devote his life entirely to religion and painting. He painted nothing but religious subjects, and preached beautiful sermons with his brush. His first paintings, as a young monk, were done at the city of Cortona, but they have now been destroyed. In 1418 he was recalled to Fiesole, and laboured there until 1436. Then he went down the hill into Florence, to reside in what was then the Dominican convent of St. Mark, but is now a national museum.

Here he executed some of the most famous of the paintings which are still to be seen. Some remain where he painted them; others have been removed to places more secure. Most of them have been left just as his brush finished them; those which have been "restored," as it is called, have been spoiled. His fame spread, and he was called to do paintings at Orvieto and Fiesole.

Fra Angelico's work at Fiesole is not entirely unknown in England, which is fortunate enough to possess a specimen of it in the National Gallery. It is a magnificent painting of Christ bearing the banner of the Resurrection, attended by a host of saints. This picture serves to show how industrious Fra Angelico was, for in it no fewer than 266 figures of saints are drawn. After he had been nine years at Florence Fra Angelico was summoned by the Pope to Rome. The Pope had heard of the painter's godly life as well as of his work as an artist, and wished to make him Archbishop of Florence.

How the humble friar refused honour and dignity

The painter was as modest as he was good and skilful. He prayed the Pope not to make him accept the dignity, and the Pope permitted him to remain a humble friar, and appointed instead a friend of Fra Angelico. In 1445, and again in 1455, Angelico worked in the Vatican. He died in Rome in the latter year, and there he was buried.

There never was a more beautiful life than that of Fra Angelico. He laboured with all his zeal for the poor, who regarded him as a brother. He regarded his ability to paint as a gift from God. When he wished to paint he used to kneel and pray. Then he rose and did the work upon which he had set his mind. What he had once painted he never altered.

Fra Angelico felt that everything he did as an artist was in answer to his prayers, and that therefore it must stand, as of too holy an origin to be touched up or improved. Religion was to him his hope and joy, and he tried to lead others to share his rapture by the most beautiful paintings of heavenly beings, and by presenting, with all his tender genius, the stories of the Bible. He painted the sorrows of Jesus as well as His triumphs. These were sad days in the life of Fra Angelico, and he would weep bitterly as he painted the Crucifixion.

Savonarola, the great monk who made kings tremble

Savonarola is one of the picturesque figures of the Middle Ages. In the midst of that gorgeous, wicked, and careless period, we see the shrunken figure and the gaunt face of a little hooded man, whose glowing black eyes, flashing judgment and anger, glance like lightning on the crowd from under the shadow of his cowl. He was terrible to sin. Rulers feared him, wicked people maligned him, and the populace was swept like a sea by the tempest of his preaching. He came from his monastery to chastise the world. The world accepted the conflict. Savonarola was raised high in honour, then tried, tortured, hanged, and burned. His ashes were thrown into the river.

Such, in brief, is his history. When we look more closely at this great figure we are puzzled by many things. Some people would have us believe that scarcely a greater hero ever crossed the earth; others that he was perhaps the grossest impostor who ever lived. To-day men read history not to take sides in a fight, but to see the truth of things. Savonarola appears to us now a strange mixture of nobility and delusion. We call him a hero, we cannot call him an impostor; but we can criticise him.

He seems to us not a man who sought to deceive, but was himself unconsciously deceived. He believed, for instance, that evil spirits came and wrestled with him in his cell; that the Holy Spirit settled on his shoulder in the form of a dove, and spoke in his ear through the dove's beak; he declared that he conversed with God; he saw visions of the most frightful and appalling description.

How the severe life of Savonarola affected his thought and action

All this, in our day of calm reason and medical knowledge, assures us that the hero-like soul of this good man was afflicted by the distempers of his brain. The preacher who sways a multitude needs a cool head. The severe discipline practised by Savonarola—his brief hours of sleep, his long prayers, his sparing food, his deficiency of healthy physical exercise—unfitted him for meddling in politics. He was certainly a very dangerous man.

But his courage was magnificent. His hatred of vice and luxury was most honest. The wickedness of the Court of Rome hurt his noble soul to the quick. If ever a man felt the sharp contrast between the simplicity of Jesus and the magnificence of His Church, it was this fiery prophet of Florence. As he passed to the gibbet

THE LAST COMMUNION OF SAINT JEROME

ST. JEROME DYING IN THE CHAPEL OF HIS MONASTERY AT BETHLEHEM

ST. BERNARD, AFTER ROUSING EUROPE FOR THE SECOND CRUSADE, LIVING A SIMPLE LIFE

on which he was burned—in sight of the beautiful cathedral shown on page 2781, where great crowds had flocked to hear his preaching—a bishop said :

"I separate thee from the Church militant and the Church triumphant."

"Not from the Church triumphant," replied the monk, with quiet confidence, "that is beyond your power."

THIS FLORENTINE REMAINED A MONK OF THE ROMAN CHURCH

Protestants have claimed him for a martyr ; but he appears to have adored the Sacrament before his death, and to have confessed himself a true son of the Roman Church. Savonarola was born in 1452, and died in 1498.

The famous portrait by a fellow monk, Fra Bartolommeo, is given in the group on page 3981. It was painted from life, and the original still hangs in Savonarola's cell at the monastery in Florence.

In 1491 there was born in a Spanish castle a boy destined to become one of the most famous men who ever threw off the world to put on the monk's hood. This was Inigo Lopez de Recalde, known to history by his monk's name and his Roman sainthood, as St. Ignatius de Loyola. He was a nobleman, and grew up on his father's estate without learning of any kind. He became a page in the court of Ferdinand, and, later, embraced the profession of arms. While following the calling of a soldier, he was severely wounded in the right leg at the siege of Pampeluna. While he lay in his father's castle recovering himself of this wound, certain books of religion, given to him to while away his idleness, laid a hold on his soul.

THE SPANISH SOLDIER WHO FOUNDED THE ORDER OF JESUITS

When he rose from the bed it was to journey to a church, where he hung up his soldier's arms, and vowed himself to live a religious life. He removed himself to a hospital, and worked in menial offices to learn humility. Then he journeyed to Jerusalem, and came back inspired with the idea of founding a new religious society. He put himself to school to learn. While learning he began to influence men. Directly he stated his simple views, however, the hand of authority seized upon him, and he had to flee. From city to city he went, begging his way, until at last in Paris he found freedom, and there he lived as a mendicant. At the university his persuasive powers drew certain young men to his side, and at the age of forty-six he was ordained, and set out on his preaching mission.

His burning zeal had drawn around him a remarkable group of men. Six of them met with him in 1534 in the Church of Montmartre and bound themselves to chastity, poverty, and obedience to their superiors. From such small beginnings, made with difficulty and against great discouragement, one of the greatest religious orders sprang.

The miracle of Loyola lies in his creation of the Jesuits, a society spread all over the world, and working in many languages to one and the same end.

For a man who was not ordained until he was nearly fifty, and who was fighting at the age of thirty, this is a most remarkable achievement. Loyola is not responsible for the political power which his society soon gathered. His influence was purely spiritual.

THE WONDERFUL POWER THAT LOYOLA HAD OVER MEN

He drew men to him by the force of his holiness. It is narrated of him that while in Paris he sought to gain the affection of a young student named Xavier, who withstood all the earnest advances of the religious zealot.

One day Xavier, having done well in the class for philosophy, was strutting about in great pride, when Ignatius came to his ear and whispered : "What shall it profit a man if he gain the whole world and lose his own soul ?" Xavier was converted, and became the famous St. Francis Xavier of the Jesuits. Such was the real power of Ignatius—a personal influence on the side of holiness. Loyola died at Rome in 1556, utterly worn out by his labours and his severe mode of life.

The distinguishing feature of the Jesuit Order is that the members do not retire from the world and shut themselves up within the forbidding walls of a monastery, where they know little or nothing of the busy world, and the busy world knows little and cares less about them. They remain very much in the world, and are active in the homes of men, in the parliament of nations, and in the councils of Rome. They are monks of the world.

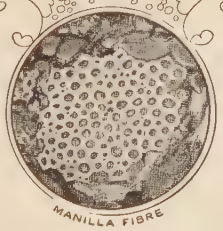
The next Men and Women begin on 4053.

We should hardly think that there was any connection between this picture and a piece of rope. Yet here we see rope growing in the shape of hemp. This kind of hemp is called Sisal hemp, because it grows at Sisal, in Yucatan. There are miles and miles of hemp plantations like this in Mexico.

A PIECE OF ROPE

CONTINUED FROM 3896

THERE is a baby rope in the cages of most song-birds. It is in the seed-pot. If we look we shall find only seed: canary-seed, rape-seed, mustard-seed, perhaps, and hemp-seed. It is the hemp-seed that is the baby rope.



MANILLA FIBRE

If we were to set some of those seeds, we should find that they would grow, in rich, damp soil, fed by the hot sun, into great plants. To see the best American hemp we must go to some parts of Kentucky, or better yet, to California. But foreign hemp is to be found under the blazing sun of the tropics, and in the cold lands of Northern Russia.

It is the stalk of the plant that we need for our ropes and strings and twines. Upon it grows a bark made up of fibres. If we want fine fibre to make cloth, we pluck up the plant as soon as it has flowered. If we want coarser fibre for the making of sails, we let it grow a little longer. If we want the coarsest of all—for strings, and cords, and ropes—we let the hemp grow as long as it will.

So much for the baby rope which we see in the cage-bird's seed-pot. But there are various other things which make ropes. Those brown ropes which are never tarred, and are so much lighter than hempen ropes, are made from the husk of the cocoa-nut, and are called coir ropes. Then there is a fine rope, used in the driving of machinery, made of cotton. But the most wonderful rope is made from a plant named the *abaca*, and more generally called Manila hemp. It grows in the Philippine Islands, and the islanders receive about $20,000,000 a year from it. The natives split the leaf-stalks into long strips, beat them with clubs, then wash and dry them.

The making of rope is now an elaborate process in which very wonderful machines are used. In making rope by hand, the fibre of the hemp is separated from the stalk by long soaking in water. Then the fibre has to be divided, and the short lengths removed. The long pieces are laid parallel to each other, and the ends are attached to a revolving hook. The workman winds some hemp round his waist, and walks backwards, twisting the pieces, fitting them into the strand that he is making, and shaping them properly. All the time the hook to which the end is fastened continues to spin round. Very little rope is made in this way, as machinery, of course, does this very rapidly.

GETTING THE HEMP READY TO MAKE ROPE

Manila hemp, which grows in the Philippine Islands, differs very much from the Sisal hemp, shown on page 3991. Sisal hemp is something like mammoth grass, but Manila hemp is taller and looks like a palm.

The leaf-stalks of the hemp are stripped from the trunk, and then the natives of the Philippine Islands split the stems into lengths two or three inches wide, using a kind of bamboo knife, as seen in this picture.

After being stripped and split the hemp-stalks are scraped, as shown here, until only the fibre remains. Then this fibre is washed and dried, and packed into bales ready to be sent all over the world. Two men working all day can prepare 25 pounds of hemp, and it takes 3,000 trees to produce a ton of hemp, worth from $150 up.

MAKING ROPE FROM COCOANUT SHELLS

A very elastic rope is made from the outer covering of the cocoanut, which, as we know, is quite fibrous, or stringy. The husks are first gathered in heaps, as shown in this picture, and then soaked for months in water to make the fibres soft. The cocoanut fibre is called coir, which is from an Indian word meaning rope.

Coir rope is made in India and Ceylon with very simple machinery. A number of natives stand, as you see here, each with a bundle of prepared coir under the left arm. The ends are fastened to a wheel, which a man turns, and as more and more fibre is added, the rope grows gradually longer and longer. Coir ropes are very strong.

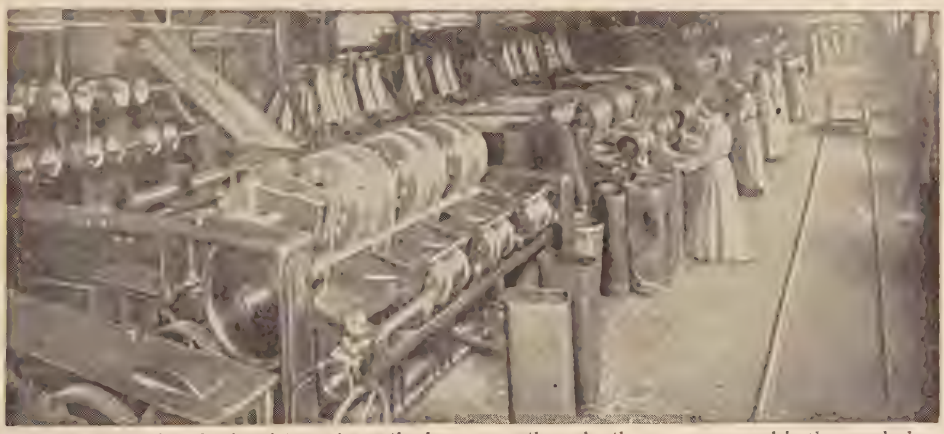
THE OLD WAY OF MAKING ROPE BY HAND

The old-fashioned way of making rope by hand is fast dying out, although it still exists in some small rope-works. Here we see the men combing out the hemp by drawing it through a series of long spikes fixed into boards that look something like inverted rakes. The men work quickly, but it takes a long time to prepare a ton of hemp by hand.

Here we have an old-fashioned rope-walk; but there are not many places in America to-day where we can see a scene like this. The method is very much like that of the natives shown on page 3995, each fibre being added by hand, and the workers become wonderfully expert and quick in making ropes of the same thickness from end to end.

THE MODERN WAY OF MAKING ROPE

This picture shows the first process in making rope in an up-to-date factory. The hemp is taken from the bales and fed into a machine called a spreader, which spreads out the hemp so that it may be easily dealt with.



After being spread, as in the picture above, the hemp goes through other processes, and is then combed, or drawn, out by machines like those seen here. It runs into iron cases, and is wheeled away to the spinning-room.

Although the hemp for the strongest ropes comes from the Philippines, we receive a great deal from Russia and Italy. This is true hemp; for Manila hemp is not really hemp at all, but is from a different kind of plant altogether. Here we see women preparing Russian and Italian hemp. All the machinery used in rope-making is very elaborate, and works rapidly. Each machine in the top picture prepares 10,000 pounds of Manila a day.

SPINNING THE HEMP INTO ROPE AND TWINE

In this room twine for fishing-nets is being made and there are 150 spinning machines at work. If we went into the room, we should be deafened by the whirring of the wheels; but the workers get used to the noise.

Here we see Russian and Italian hemp being spun into rope. More than a hundred years ago, Dr. Edmund Cartwright, who invented the power-loom for cotton-weaving, made a rope-spinning machine which he called a cordeher, and it is really on this that all the magnificent modern machinery for rope-making is based. Cartwright received $50,000 from Parliament for his inventions, which had added greatly to the prosperity of the British nation.

COMBING OUT THE TANGLED HEMP

When we see great heaps of hemp, such as are lying in this room, it seems impossible that the tangled mass could ever be unravelled. But by passing it through a machine called a carding machine, it comes out quite clear.

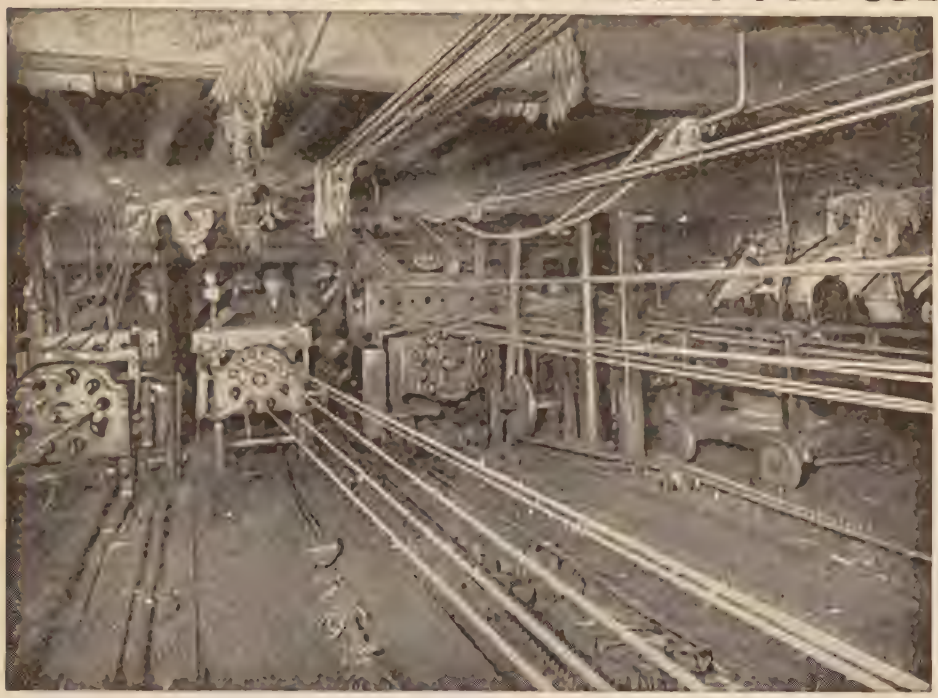
The coarser parts of hemp are called tow, and these are separated from the finer threads by a process known as backling, the hemp being placed in a machine that has two endless bands studded with spikes. Here we see the tow being combed out in the drawing room ready for spinning. The word tow simply means fibre.

WINDING AND STORING THE TARRED YARN

A great quantity of yarn, or hemp fibre, is tarred ready to be made into tarred rope; and in this store we see 150 tons, or 336,000 pounds, of the tarred yarn waiting to be wound on to spools, or reels.

This is how the tarred yarn is wound on to huge spools before being spun into a rope. In the foreground we see the full spools, to the left of the post are some spools just ready to be lifted from the winding machine, and on the right are some empty spools just being filled. The spools are wound twelve at a time.

THE ROPE FINISHED AND READY FOR USE



This is a present-day rope-walk. Instead of one or two men walking up the length of the alley with the hemp in their hands, elaborate rope-making machines run on rails; and in the rope-ground shown in this picture, which is 1,200 feet long, as many as 18 tons of rope can be made in a single day. The length varies according to the weight.

Here we see the finished rope. Apart from the rope we make in America for our own use we send abroad a large quantity of rope and string every year. This if joined would go round the world many times. One of the longest manila ropes ever made in one piece was over eleven miles long and cost nearly $12,000.

THE NEXT STORY OF FAMILIAR THINGS IS ON PAGE 4079

PRINCESS MAYBLOOM AT THE FOUNTAIN

After travelling for some hours, they reached the place, and, sitting down, Princess Maybloom pulled off her stockings and dipped her feet into the marvellous fountain. The moment her feet touched the water they grew less.

THE STORY OF FAIRYFOOT

CONTINUED FROM 3855

ONCE upon a time there stood far away in the West Country a town called Stumpinghame. Stumpinghame had a king of its own, and his name was Stiffstep; his family was very ancient and large-footed. Great feet had been the fashion there from time immemorial, and the higher the family the larger were they. His queen, Hammerheel, was the greatest beauty in Stumpinghame. Her Majesty's shoe was not much smaller than a fishing-boat; and their six children promised to be quite as handsome, and all went well with them till the birth of their seventh son, when it was whispered throughout the city that the queen's seventh child had been born with such miserably small feet that they resembled nothing ever seen or heard of in Stumpinghame, except the feet of the fairies.

The king and queen were so ashamed of him that the young prince was sent privately out to the pasture lands, to be nursed among the shepherds. The chief man there was called Fleecefold, and people came from all quarters to see the young prince.

The king and queen had given him fourteen names, beginning with Augustus; but the honest country people could not remember so many; besides, his feet were the most remarkable thing about the child, so with one accord they called him Fairyfoot. He was a handsome boy, but the news of the court travelled to the shepherds, and Fairyfoot was despised among them. Fleecefold was ashamed to have him in his cottage, and as soon as he was old enough, Fairyfoot was sent every day to watch some sickly sheep that grazed on a wild, weedy pasture, hard by the forest.

Poor Fairyfoot, who was often lonely and sorrowful, was lying in the shadow of a mossy rock one warm summer noon, when a robin, pursued by a great hawk, flew into the old velvet cap which lay on the ground beside him. Fairyfoot covered it up, and the hawk, frightened by his shout, flew away.

"Now you may go, poor robin!" he said, opening his cap; but instead of the bird, out sprang a little man dressed in russet brown, looking as if he were a hundred years old. Fairyfoot could not speak for astonishment, but the little man said:

"Thank you for your shelter, and be sure I will do as much for you. Call on me if you ever want help; my name is Robin Goodfellow." And, darting off, he would have been out of sight in an instant had not Fairyfoot jumped up and called him back.

"What is it?" said the little man.

"I am very lonely, and no one will play with me, because my feet are not large enough," said Fairyfoot sadly.

"Come, then, and play with us," said

the little man. "We lead the merriest lives in the world, and care for nobody's feet; but there are two things you must mind—first, do as you see the rest doing; and, secondly, never speak of anything you may hear or see."

"I will do that, and anything more you like," said Fairyfoot; and the little man, taking his hand, led him over the pasture into the forest, and along a mossy path among old trees wreathed with ivy, till they heard the sound of music, and came upon a meadow where the moon shone as bright as day, and all the flowers of the year bloomed together in the thick grass. There was a crowd of little men and women, some clad in russet colour, but far more in green, dancing round a little well as clear as crystal. And under great rose-trees, which grew here and there in the meadow, companies were sitting round low tables covered with cups of milk, dishes of honey, and carved wooden flagons filled with clear red wine.

The little man led Fairyfoot to the nearest table and bade him drink. Immediately the red wine touched his lips, all his troubles seemed to leave him, and the little people about the well cried: "Welcome! welcome!" and every one said: "Come and dance with me!" So Fairyfoot was as happy as a prince, and drank milk and ate honey till the moon was low in the sky; then the little man took him by the hand and led him back to his own bed of straw in the cottage corner.

Next morning Fairyfoot was not tired for all his dancing. Nobody in the cottage had missed him, and he went out with the sheep as usual; but every night all that summer, when the shepherds were safe in bed, the little man came and took him away to dance in the forest.

The wonder was that he was never tired or sleepy, as people are apt to be who dance all night; but before the summer was ended, Fairyfoot found out the reason. One night, when the moon was full, Robin Goodfellow came for him as usual, and away they went to the flowery green. The fun there was high, and Robin was in haste. So he only pointed to the carved cup from which Fairyfoot every night drank the clear red wine.

"I am not thirsty, and there is no use losing time," thought the boy, and he joined the dance; but never in all his life did Fairyfoot find it such hard work to keep pace with the company. Fairyfoot did his best, but at length he was glad to steal away, and sit down behind a mossy oak, where his eyes closed for very weariness. When he awoke, the dance was nearly over, but two little ladies clad in green talked close beside him.

"What a beautiful boy!" said one of them. "What handsome feet he has!"

"Yes," said the other, "they are just like the feet Princess Maybloom had before she washed them in the Growing Well, which has now dried up. Nothing in this world can make them small again, you know."

When they were gone, Fairyfoot could sleep no more for astonishment. It amazed him that Princess Maybloom's father should be troubled at hers growing large. Besides, he wished to see that princess and her country. All that day he was so weary that he got into sad disgrace with the shepherd for neglecting his sheep. The old man beat him so cruelly that he determined to run away.

So on and on he ran, far into the forest, until at last, utterly exhausted, he sank down at the foot of a tree and fell fast asleep. When he awoke, he heard voices.

"What boy is this?" said a nightingale on a branch above him. "He cannot have come from Stumpinghame with such small and handsome feet."

"No," said another; "he has come from the West Country. How in the world did he find the way?"

"How simple you are!" said a third nightingale. "What had he to do but follow the ground-ivy which grows over height and hollow, bank and bush, from the lowest gate of the king's kitchen-garden to the root of this rose-tree?"

Fairyfoot was greatly astonished at this conversation, and thought it might be as well for him to follow the ground-ivy, and see the Princess Maybloom. It was a long journey, but he found the gate at last, and walked through the garden, till a white fawn came frisking by, and he heard a voice saying sorrowfully:

"Come back, come back, my fawn! I cannot run and play with you now, my feet have grown so heavy." And,

looking round, he saw the loveliest young princess in the world, dressed in snow-white, and wearing a wreath of roses on her golden hair. At once he guessed that this must be the Princess Maybloom, and made her a very humble bow.

"Royal princess, I have heard of your trouble because your feet have grown large, and I know of a certain fountain in my country that will make them smaller and finer than ever they were," said he.

When the princess heard that, she danced for joy in spite of her large feet, and she and her six maids brought Fairyfoot before the king, who consented to allow the princess to accompany Fairyfoot to the marvellous fountain.

After travelling for some hours, they reached the place, and, sitting down, Princess Maybloom pulled off her stockings and dipped her feet into the fountain. The moment her feet touched the water, they grew less, and when she had washed and dried them three times, they were as small and finely shaped as Fairyfoot's. There was great joy among the company, and the princess thanked Fairyfoot again and again.

Just at that moment they heard a sound of music, and Fairyfoot knew it was the fairies going to their dancing-ground. Rising quickly, he took the Princess Maybloom by the hand, and all followed the music through the forest. At last they came to the flowery green. Robin Goodfellow welcomed the company for Fairyfoot's sake, and gave everyone a drink of the fairies' wine. So they danced there from sunset till the grey morning; but, before the lark sang, Robin Goodfellow took them all safe home.

There was great joy that day in the palace because Princess Maybloom's feet were made small again. The king gave Fairyfoot all manner of fine clothes and rich jewels; and when they heard his wonderful story, he and the queen asked him to live with them and be their son.

In the course of time Fairyfoot and Princess Maybloom were married, and they both lived happily ever after.

THE DOG THAT KNEW HIS MASTER

A TRUE TALE OF A SCOTTISH COLLIE

GOILA was a Scottish collie, born on a sheep-farm by the picturesque banks of Loch Goil. Hence the name by which, by a child's happy freak, he was called. His parents were of high degree on both sides, and had won prizes on the show-bench and in the trial-field.

When full grown, Goila was a perfect type of animal grace. The head was poised on a long, arched neck; the back broad, with an upward curve in the loins; the quarters muscular; the shoulders well set back and powerful; the legs rather high and never tiring; the body, except the deep chest, which boasted a snow-white "shirt-front," was covered with the glossiest blue-black coat, which one could feel was impenetrable to the sharpest cold; and the tail was large and bushy—a true flag-signal in frolic, peace, or war.

But it was the head itself which won love and admiration: a broad skull, flanked by small, forward-drooping ears when quiet, but instantly erect when alert; the muzzle was smooth, fine, and tapering, and a white line ran down the forehead; the eyes were full, bright, expressive, spirited, and intelligent. Goila grew up more than a pet. With the children he was a comrade in fun and play; with the head of the household he was a friend and companion in the best sense of the term.

Early in puppyhood, Goila showed musical tastes. In the parlour was a cottage piano, and it was noticed that Goila, if he possibly could get access to the room, lay beside the pedal just below the keyboard.

By and by, as his musical education progressed, so did his likes and dislikes in harmonies.

When some compositions were being played, he became almost frantic, running round the room, barking angrily. Others seemed to please him; and he would crouch down on the carpet and emit a prolonged cry, which rose and fell with a distinct cadence. He was a loyalist: he invariably joined in with fervour, and not out of tune, when the children sang "God Save the King."

One day, when it was known that there was no person in the parlour, notes were heard coming from the piano

as if someone were striking the keys at random. When the door was opened, Goila was found standing on his hind legs, with his two fore-paws pressing here and there on the keys, the response from which was evidently to his intense delight. The hint was enough.

The children taught him, with assistance, of course, to pick out "Hadyn's Hymn" not at all badly. He was a religious doggie, as he never ventured to utter a note during the Sunday evening hymn. But the greatest fun was when a German band came round to the street. The moment Goila heard the toot-toot, he ran to the band with the keenest enjoyment. He jumped round the somewhat resentful musicians, howled and pranced approval or otherwise, and if, perchance, which was often the case, an inexpert or careless instrumentalist played a wrong note, Goila rushed at his heels. In fact, he became so unwelcome a critic that the band very soon ceased to come to the street.

THE DOG STOPPED AND PRICKED HIS EARS

He had social instincts. His most curious friendship was that with a tortoise. When the latter became accustomed to the dog, it put out its head from its shell, and allowed Goila to lick it. There was a step leading from the kitchen to the scullery, and another from the scullery to the back garden. When the tortoise wished to take its walks abroad, Goila would carefully assist it down the steps, and watch it with curious interest searching for and eating lettuce. But Goila's love for his mailed friend was the undoing of the latter. When autumn came, the tortoise dug a hole in the garden soil in which to sleep through the winter. Goila smelt him out, and excitedly rescued his friend from premature burial. From cold and want of his winter sleep the tortoise died.

Goila was a wonderful retriever either of children's boats or caps on the lake, or of articles artfully hidden in holes or beneath stones. He had cunning distinctions as to what was fair game. Early in the morning after a first day's stay in the schoolhouse of a Highland village, Goila was found to have brought to the kitchen door a rabbit and a partridge. We wished to live at peace with the gamekeeper, and solemnly admonished Goila never to bring in another bird; we soothed our conscience by telling the dog that rabbits were vermin. Never another bird was found on the doorstep; but, truth to tell, there was occasionally rabbit-pie for dinner.

How long does a dog's memory remain fresh? It is hard to say. The writer had occasion to go abroad. Although Goila was supposed to be locked up when he left home to take the train for London, the dog came tearing along the departure platform as the guard gave the signal for the start, and was last seen galloping at a great speed and howling furiously as the train disappeared in the darkness of the night. Some days afterwards he returned home, footsore and with a ragged coat. The dog was disconsolate; he lost all interest in his old home and its inmates, and after a few weeks disappeared. Seven years elapsed, and the writer returned to this country. One afternoon, a month afterwards, in the southern district of his own town—Edinburgh—he saw Goila trotting at the tail of a butcher's cart. Merely on the off-chance of a recognition, he called out: "Goila!" The dog stopped, pricked up his ears, gave a wild yelp of delight, circled round and round, leaped up with his fore-paws on the shoulders, and licked the dearly-loved face of his old master.

But the new joy was short-lived. A very few months passed, when Goila disappeared as if it had all been a dream; and, despite every inquiry by advertisement and otherwise, he was, to our great sorrow, heard of no more.

THE LITTLE MAIDEN OF THE LAKE

THE STORY OF BERTHA AND UNDINE

ONCE upon a time there lived in Germany an old fisherman and his wife, who had one little daughter.

The part of the lake country in which they lived was so wild and desolate, and there were so many stories about the woods and rocks and rivers being enchanted, that at last, for the sake of their little daughter, they determined to move away. But on the very evening that the fisherman returned from his long journey to the nearest town for this purpose, he was met by his pale and trembling wife with the news that their little daughter had fallen into the lake and had been washed away.

How great was their sorrow! How terrible their loss! Their one possession was taken away; the one hope in their lives vanished. These old people, who worked so hard and who lived so far away from other people, had nothing left to make life bright and joyous.

A storm arose as they sat mourning in their cottage: the walls shook, the doors rattled and creaked, and the windows were lashed by rain. As the old couple sat with bowed heads in front of the fire, grieving for their lost child and listening to the tempest, suddenly there came a faint cry from outside, and a hand seemed to be fumbling at the door.

The fisherman got up and crossed the room, thinking that a sailor or a traveller had come for shelter to his cottage. But when he opened the door, instead of a pale and frightened man, a girl of surpassing loveliness, all wet and streaming from the storm, and yet bright with joy and pleasure, stepped quickly into the room and ran laughing to the fire.

The old couple were amazed by the sight of their visitor, and could hardly speak for astonishment. And when they did find their voices, and began to question the pretty little girl, it was only to be filled with still greater astonishment. For she could tell them nothing of her parents, nor of the place from which she had come; and only repeated, again and again, the statement that she had fallen into the lake, and that her name was Undine.

It seemed as if Providence had sent this strange visitor to take the place of the little drowned girl, and so the fisherman and his wife made her welcome. But though they loved her dearly, and made many sacrifices for her happiness, she was often a very great anxiety to the old couple. For whenever the wind blew and the rain fell, whenever the lightning flashed and the thunder roared, whenever the streams were in torrent and the waves of the lake rose in great mountainous masses, little Undine would open the latch of the cottage door and run out into the midst of the storm, clapping her hands and singing with delight, saying that she loved these things more than sewing, and dusting, and cooking.

Sometimes she was unkind to the fisherman's wife, and sometimes she vexed the old fisherman sorely. But though she was thus ungrateful and impolite, she was never sullen or black-tempered. It was her waywardness of disposition, not wickedness, that caused her to grieve her foster-parents.

Undine was growing into a lovely maiden when there came to the fisherman's cottage a handsome knight, who had lost his way in the forest.

His name was Hildebrand, and he had taken part in a tournament, where a proud lady named Bertha had used him badly. He was gloomy and sad, feeling that his love for Bertha was hopeless, and wondering how so beautiful a lady could have treated him so ill. But although he was so sad, Undine thought that she had never seen anything on earth so beautiful as this young knight.

She sat on a stool at his feet, gazing up into his face, and listening to his voice. Then she took his hand, and held it, and kissed it. He was the one thing greater and more beautiful to her than the tempest and the voice of the waters.

The knight was amazed at the strange maiden. He questioned the fisherman about her, and heard the story. "She is probably a nobleman's daughter," he thought. Undine talked to him about the winds and the clouds, the rain and the storm, and took him to visit many places of great beauty, but awful loneliness, in this deserted neighbourhood.

She took him into the enchanted forest, and, mounted on his own horse, showed him wonderful and magic things. The more the knight spoke to her, the more he felt the wonder and charm of this wild maiden. At last, so greatly did he admire Undine that he proposed marriage to her, and it was agreed that they should soon be married.

And now the true story of Undine must be told. When the fisherman's daughter fell into the lake, the fairies decided to give the old couple another daughter, and Undine was sent to them. She was a water-nymph, and, like all other creatures of that kind, possessed no soul. Her father wanted her to have a soul, and so he sent her to become a human being. Because the old fisherman and his wife were bereft of a daughter, Undine was sent to them.

When the priest came to marry Undine, he was surprised by her wild ways, and spoke seriously to her about the soul. At first she only laughed; but, after hearing the prayers of the priest, she said:

"There must be something beautiful, but, at the same time, extremely awful, about a soul. Tell me, holy sir, were it not very much better that we should never receive such a wondrous gift?"

The beautiful maiden, who loved Nature, felt that to possess a soul meant something dreadful in her life. It was a great gain, but it entailed a terrible loss. She would become immortal, but first she would have to taste the cup of human grief and mortal pain. Nevertheless, so great was her love for Hildebrand that she knelt meekly before the priest, and in prayer became a human being.

Her nature seemed to change at once. She became grateful to her foster-parents. A great and inexpressible tenderness took the place of her old wilfulness. She was loving and helpful to the fisherman and his wife. She showed her husband the depth of a nature to which love was all in all.

UNDINE SHOWED THE KNIGHT MANY MAGIC THINGS IN THE ENCHANTED FOREST

For some little while Undine was supremely happy. But as she was journeying with her husband and her foster-parents to Hildebrand's castle, they stayed at the castle of another great lord, whose adopted daughter was the proud Bertha once loved by Hildebrand. It was revealed to Undine that this Bertha was the daughter

of the fisherman and his wife, who had fallen into the water. One day she sang a beautiful song about Bertha's real parents, and Bertha was melted into tears.

"Oh, Undine," she exclaimed, "show me my parents, that I may go and love them!" But when Undine replied: "Dearest Bertha, these are your parents," the proud damsel vowed that she could not possibly be the daughter of a fisherman, but marks on her shoulder and foot proved that she was the fisherman's daughter, and she burst into angry tears, being ashamed of her poor parents.

Undine was sorry for the proud girl, and persuaded Hildebrand to invite her to their castle. When they arrived there, Bertha set herself to revive Hildebrand's love, and presently made the husband cruel to his wife. Poor Undine warned him that something dreadful would happen if he spoke cruel words to her.

But Bertha was always making Hildebrand more and more angry with Undine. At last one day, as they were sailing on the Danube, Hildebrand spoke more angrily than ever to his wife. "Alas, sweet friend," she exclaimed, "alas, farewell!" and vanished over the side of the vessel. All the waves began to cry out: "Oh, woe, woe! Oh, remain true! Oh, woe!"

Some time after the disappearance of Undine, Hildebrand married Bertha. The wedding ceremony, however, was one of the deepest gloom. Hildebrand retired early to his room. As he stood before a mirror, he heard a tap at his door which reminded him of Undine's entrance. Then he heard a voice. Then in the mirror he saw the door opening—very slowly—and a white figure glided into the room. He dare not look at the figure, except in the glass.

"You must die," said a voice.

"Do not make me mad with terror!" cried Hildebrand. "If you wear a hideous face behind that veil, do not raise it; take my life, but do not let me see you." But the veil was lifted, and he saw the exquisite face of Undine. Then he swooned into her arms, and, while she kissed him, he wept away his soul.

From near the grave where Hildebrand was laid, a little silver spring gushed forth, and people say that it is Undine, the water-nymph, who still holds her husband in her loving arms.

LA PLUS SAGE FILLE DU WESSEX

THE ENGLISH VERSION OF THIS STORY IS GIVEN ON PAGE 2302

Il y avait autrefois un Roi de Wessex appelé Ina. Il était grand, brave et beau, mais avait un grand défaut. La moindre des choses le vexait et le mettait dans une colère terrible. Le sachant, il décida d'épouser une fille sage qui pourrait le calmer et le diriger. Une après-midi, il quitta Winchester et alla dans la grande forêt, à cheval. Ayant soif, il s'arrêta à la cabane d'un bûcheron pour boire du lait. La jolie fille du bûcheron lui apporta du lait et quand il lui rendit le gobelet, il lui dit :

"Je suis le Roi de Wessex, Ina. Videz toutes les mers du monde avec ce gobelet et je vous ferai ma Reine."

Edith entra dans la cabane, en ressortit avec une poignée d'étoupe et la tendant au Roi Ina, elle s'écria gaiement :

"Barrez toutes les rivières avec cette étoupe et j'obéirai à votre désir."

"Vous êtes celle que j'ai cherchée," dit le Roi Ina.

Et il la mit sur son cheval et la conduisit à son palais de Winchester. Mais juste avant le mariage, Edith lui dit :

"Vous savez que vous avez l'humeur ombrageuse. Promettez-moi donc, si vous vous fâchez avec moi et me chassez du palais, de me laisser emporter un cadeau d'adieux."

Le Roi Ina y consentit, naturellement. Comme ils étaient à souper, un soir, Ina fut offensé par un bon conseil que sa femme lui donna, et s'écria :

"Vous vous mêlez trop de mes affaires. Demain, vous retournerez avec votre père à votre cabane."

Quand son mari eut le dos tourné, elle versa une potion dans son breuvage, ce qui le fit s'endormir. Ensuite, elle le fit transporter doucement à la cabane dans la forêt.

"Qui m'a conduit ici ?" cria-t-il en s'éveillant le lendemain matin.

"C'est moi, chéri," dit la Reine Edith. "Vous êtes mon cadeau d'adieux."

"Ah!" dit le Roi Ina en l'embrassant, "j'ai eu raison d'épouser la plus jolie fille du Wessex, et aussi la plus sage!"

THE FABLES OF ÆSOP THE SLAVE

THE PEACOCK AND JUNO

A PEACOCK, feeling one day very discontented, said to the goddess Juno:

"Why did you not give me such a good voice as the nightingale? Everyone is pleased to hear its voice, whereas I am laughed at for the ugly screaming noise that I make."

Juno, who was very much concerned at the discontent of her favourite bird, replied:

"True, the nightingale has a fine voice, but you have the advantage in your beauty and elegance."

"But what is the use of my silent beauty, when I have such a poor voice?" demanded the peacock.

Juno dismissed him, saying:

"Each creature has some of the good things of Nature. This one has beauty, that one a glorious voice, another strength, and so on, and each should be content with its particular quality."

Be content with what you have.

THE FOX AND THE FROG

A FROG one day told the various animals in the forest that he was able to cure all kinds of illness. He spoke in a hoarse croak that was little understood, and the animals therefore admired his learning, and believed what he said. A fox, however, who happened to be passing at the time, said, with indignation:

"How can you have the impudence to offer to cure others, when you have such an ugly spotted body and horrible croaking voice?"

People should cure their own faults before finding faults in others.

THE HEN AND THE FOX

A HUNGRY fox went into a fowl-house in search of something to satisfy his appetite. He saw, sitting on a perch, a fat hen; but, try as he would, he was unable to reach her. At last he thought of trying to make her descend from her position.

"Cousin hen," said he, "I heard that you were ill, and so I have come to inquire how you are now. Come down, and I will feel your pulse, and tell you what to do to get better."

"True, I am not feeling very well," answered the hen; "but I am sure that I should catch my death if I happened to come down from this cosy perch."

Flattery is the last resort of fools.

LE ROI, LE NOBLE, ET LE PAYSAN

THE ENGLISH VERSION OF THIS STORY IS GIVEN ON PAGE 3647

LOUIS XII. de France apprit un jour qu'un certain noble avait très brutalement châtié un paysan. Comme le Roi était appelé le "Père du Peuple," et était vraiment adoré de tous ses sujets à cause de sa bonté de cœur, on peut s'imaginer combien il dut être irrité et désolé. Il résolut de donner au noble une leçon sur la façon de traiter ceux qui étaient moins fortunés que lui, mais il ne révéla pas son plan. Pendant plusieurs semaines il réfléchit et à la fin il trouva un plan qui, selon lui, devait être excellent.

Un jour, il invita le noble à son palais et le garda à dîner. Il ne dîna pas avec son hôte, mais fit servir au seigneur un banquet magnifique. Tout ce qu'on peut imaginer de meilleur à manger fut servi, excepté du pain, car le Roi avait donné l'ordre absolu que l'on ne serve pas de pain. Le noble fut naturellement surpris par cette omission, mais, par courtoisie, n'osa pas demander une chose aussi petite et commune, en présence de tant de mets rares et délicats. Mais de plus en plus il sentit le manque de pain, tant que vers la fin du repas, il était presque enragé par l'absence d'une chose aussi nécessaire.

A ce moment le Roi entra.

"Monsieur," dit le Roi à son hôte, "vous a-t-on servi un bon repas?"

"Sire," répondit le noble, "on m'a servi un festin superbe, un festin de Roi. Et cependant, pour dire à Votre Majesté toute la vérité, il me semble que je n'ai pas bien dîné; car, pour vivre, le pain est nécessaire, et il n'y avait pas de pain à ce banquet."

"Allez," dit Louis XII., sévèrement; "et comprenez bien la leçon que j'ai désiré vous donner. Puisque vous avez besoin de pain pour vous satisfaire, apprenez à traiter plus humainement ceux qui travaillent pour le faire pousser, afin qu'on vous le serve."

THE NEXT STORIES ARE ON PAGE 4127

THE PEASANT AT THE FLOOD

CONTINUED FROM 3884

MORE than a century ago terrible floods were experienced in the neighbourhood of Verona, owing to heavy falls of snow in the Italian Alps, followed by a rapid thaw. The rivers came dashing and roaring down from the mountain-sides, overflowing their banks and carrying everything before them. Among other disasters a bridge over the River Adège was carried away, all except the middle part, on which was built the house of the toll-gatherer, and he and his family were thus left on a kind of timber island that might at any moment be swept away by the raging torrent.

The man with his wife and children appeared at the windows of their house, waving their arms frantically for help, and screaming to the onlookers in the distance to rescue them from their peril. But although there were many on the banks anxious to help the stranded family, none dared to venture upon the surging waters.

The Count of Pulverini, a nobleman of the district, came upon the scene and offered a reward of fifty pounds to anyone who would try to rescue the family, but no one would undertake the dangerous task.

At this moment a peasant, travelling from another part of the country, came to the spot, and, seeing the very great danger of the toll-keeper and his family, he immediately jumped into a boat, and, taking the oars in his hands, began to pull out towards the bridge-house. But the current was terrific, and it was only by almost superhuman strength and effort that he was able, after a long time, to bring the boat alongside the broken piers of the bridge on which the house stood.

"Courage, my friends!" he shouted to the endangered family, in order to inspire them with confidence; and at last everyone was safely in the boat.

Then came the return journey, which was even more dangerous than when the peasant first set out, for now he had a boat-load of passengers; but his strength was great, and his courage and determination were greater still, and at last he landed all safely on the banks.

The crowd broke out into a loud cheer, and the count came forward, holding out his purse by way of recompense; but the peasant, whose name has not come down to us, although his bravery and pure-hearted sacrifice will ever live in the annals of heroism, declined the reward, saying:

"I should certainly not expose my life for money. I can work for all I need to meet the wants of my wife and children. Give the money to those poor people who have lost all."

And so the brave man not only rescued the family, but by his generosity was able to supply them with sufficient money to buy a new home.

THE BOY WHO TOOK A MAN'S PLACE

ABOUT 150 years ago a young boy, who was ready to make a start in life, was apprenticed by his friends to the captain of a Scottish coasting vessel, and although in those days the seaman's life was a very hard and perilous one, the boy had sufficient liking for the sea to throw himself with all his heart into his duties.

But storms and tempests were not the only risks to which the seamen of those days were subjected. There was the press-gang, which might seize on a man and put him on a ship that was leaving England perhaps for years.

Life in the Navy was so full of brutalities and hardships that it was most unattractive, and sufficient men could not be obtained by ordinary recruiting to man the vessels of war. The press-gang was therefore set to work, and bands of ruffians used to raid a vessel or a town, seize any likely man, and carry him off to a warship, quite regardless of the fact that he might have a wife and children or an aged mother dependent upon him.

The coasting vessel on which the young apprentice sailed was visited by the press-gang in this way, and every man on board, with the exception of himself and the captain, was seized for war service. The mate had a wife and young family, and his distress at being dragged away, perhaps never again to see them, was so pathetic that the apprentice felt the greatest sympathy for him, and offered his own services if the mate could be released.

The head of the press-gang, an officer of the king, readily fell in with the suggestion, saying: "Ay, my lad. I would sooner, any day, have a likely boy with some spirit in him than a blubbery man. Come along with me."

The boy went, and the circumstances in which his services had been obtained were related to the commander of the warship, who was so pleased with the spirit and kindness of the lad that he promoted him to be a midshipman at once. The lad did his work splendidly, and took the greatest pains to learn his duties, so that promotion followed promotion in rapid succession.

At last he obtained command of a small vessel of his own, and was soon promoted to a larger one, and at last that ambition of every keen midshipman—to be an admiral of the British Navy—was fulfilled, and the young apprentice, who had sacrificed his own interests and comfort for the sake of the mate and his family, became Vice-Admiral Campbell, a name greatly honoured in the annals of the British Navy. He died in the year 1790.

A BAND OF NOBLE MEN

WHEN Napoleon was forced to retreat from Moscow because the city was in flames, he fled across the bleak, snow-covered plains of Russia, with the enemy's army in pursuit. That was in the severe winter of 1812. It was a terrible march. The hungry, sleepy, frost-bitten men—French, Italians, Germans, and Poles, soldiers from the countries subjugated by the ambitious Napoleon—were scarcely able to crawl along; yet they were urged forward in dread of the Cossacks in pursuit.

Among the Germans was Prince Emilius of Hesse Darmstadt, heading his little band of ten, all that remained of the thousand men he had led eastwards a few weeks before. As night came on, they stumbled upon a burnt hut standing out in the dark. Then the Prince Emilius, turning to his men, said:

"Dear brothers, we must rest here, trusting to Heaven that, whether we wake again on earth or not, all is well if we have faithfully borne our part in the toil and suffering."

And so they laid down in the ruins of the hut, and Prince Emilius was soon dreaming happy dreams in which he saw kind faces bending over him.

At last he woke with a start, warm and rested, wondering where he was. Then he remembered the dreary march, the snow, the hunger, and the misery. He looked about the burnt hut, but no one was there. Then he discovered that he had been sleeping beneath a pile of garments which he recognised as those of his soldiers. And as the daylight increased, he saw that the doorway was blocked up with the bodies of his noble men, who had sacrificed their lives to save his.

The next Golden Deeds are on page 4069.

A GREAT POEM BY ROBERT BURNS

ROBERT BURNS, the greatest of Scottish poets, did not write many poems of any length, most of his writings being in the shorter form of songs, in which class of poetry none has excelled him. One, and perhaps the most beautiful, of his few longer pieces is that here given. "The Cotter's Saturday Night" describes, with the purest admiration, a domestic picture of Scottish humble life which is probably as true to-day as it was in the time of Burns. The simple joys of the poor, the virtues of the lowly people, have ever been worthier of admiration than the gilded pleasures of the rich. In nothing that Burns wrote can we better observe the warm-hearted nature of the poet than in this poem in praise of these qualities, which not only make for the happiness of individuals, but for the power and patriotism of nations. The first verse of the poem is really an inscription to a certain Robert Aiken, who was one of the earliest friends of Burns, and whose memory is thus enshrined for ever.

THE COTTER'S SATURDAY NIGHT

CONTINUED FROM 3970

My lov'd, my honour'd, much respected friend!
No mercenary bard his homage pays;
With honest pride I scorn each selfish end,
My dearest meed, a friend's esteem and praise.
To you I sing, in simple Scottish lays,
The lowly train in life's sequester'd scene;
The native feelings strong, the guileless ways;
What Aiken in a cottage would have been;
Ah! tho' his worth unknown, far happier there, I ween.

November chill blaws loud wi' angry sugh;
The short'ning winter day is near a close;
The miry beasts retreating frae the pleugh:
The black'ning trains o' craws to their repose.
The toil-worn cotter frae his labour goes—
This night his weekly moil is at an end—
Collects his spades, his mattocks, and his hoes,
Hoping the morn in ease and rest to spend,
And weary, o'er the moor, his course does hameward bend.

At length his lonely cot appears in view,
Beneath the shelter of an aged tree;
Th' expectant wee things, toddlin' stacher thro'
To meet their dad, wi' flichterin' noise an' glee.
His wee bit ingle, blinkin' bonnily,
His clane hearth-stane, his thriftie wifie's smile,
The lisping infant prattling on his knee,
Does a' his weary carking cares beguile,
An' makes him quite forget his labour an' his toil.

Belyve the elder bairns come drapping in,
At service out, amang the farmers roun';
Some ca' the pleugh, some herd, some tentie rin
A cannie errand to a neebor town:
Their eldest hope, their Jenny, woman grown,
In youthfu' bloom, love sparklin' in her e'e,
Comes hame, perhaps to show a bra' new gown,
Or deposit her sair-won penny fee,
To help her parents dear, if they in hardship be.

Wi' joy unfeign'd brothers and sisters meet,
An' each for other's welfare kindly spiers:
The social hours, swift-wing'd, unnotic'd fleet;
Each tells the uncos that he sees or hears.
The parents, partial, e'e their hopefu' years,
(Anticipation forward points the view):
The mother, wi' her needle an' her shears,
Gars auld claes look amaist as weel's the new;
The father mixes a' wi' admonition due.

Their master's an' their mistress's command
The younkers a' are warned to obey,
An' mind their labours wi' an eydent hand,
And ne'er, tho' out o' sight, to jauk or play:
"An' oh, be sure to fear the Lord alway,
And mind your duty, duly, morn an' night!
Lest in temptation's path ye gang astray,
Implore His counsel and assisting might!
They never sought in vain that sought the Lord aright!"

But, hark! a rap comes gently to the door.
Jenny, wha kens the meaning o' the same,
Tells how a neebor lad cam o'er the moor,
To do some errands, and convoy her hame.
The wily mother sees the conscious flame
Sparkle in Jenny's e'e, and flush her cheek;
Wi' heart-struck anxious care inquires his name,
While Jenny hafflins is afraid to speak:
Weel pleas'd the mother hears it's nae wild worthless rake.

Wi' kindly welcome Jenny brings him ben,
A strappan youth; he taks the mother's eye:
Blithe Jenny sees the visit's no ill-ta'en;
The father cracks o' horses, pleughs, and kye.
The youngster's artless heart o'erflows wi' joy,
But, blate and laithfu', scarce can weel behave;
The mother, wi' a woman's wiles, can spy
What makes the youth sae bashfu' an' sae grave,
Weel pleas'd to think her bairn's respected like the lave.

O happy love! where love like this is found!
O heart-felt raptures! bliss beyond compare!
I've paced much this weary mortal round,
And sage experience bids me this declare:
"If Heav'n a draught of heavenly pleasure spare,
One cordial in this melancholy vale,
'Tis when a youthful, loving, modest pair,
In other's arms breathe out the tender tale
Beneath the milk-white thorn that scents the ev'ning gale."

Is there, in human form that bears a heart,
A wretch, a villain, lost to love and truth,
That can, with studied, sly, ensnaring art,
Betray sweet Jenny's unsuspecting youth?
Curse on his perjur'd arts! dissembling smooth!
Are honour, virtue, conscience, all exil'd?
Is there no pity, no relenting ruth,
Points to the parents fondling o'er their child;
Then paints the ruin'd maid, and their distraction wild?

But now the supper crowns their simple board:
The halesome parritch, chief o' Scotia's food;
The soupe their only hawkie does afford,
That 'yont the hallan snugly chows her cood;
The dame brings forth in complimental mood,
To grace the lad, her weel-hain'd kebbuck fell;
An' aft he's prest, an' aft he ca's it guid,
The frugal wifie, garrulous, will tell,
How 'twas a towmond auld, sin' 'lint was i' the bell.

The cheerfu' supper done, wi' serious face
They round the ingle form a circle wide:
The sire turns o'er, wi' patriarchal grace,
The big ha'-Bible, ance his father's pride:
His bonnet rev'rently is laid aside,
His lyart haffets wearing thin an' bare:
Those strains that once did sweet in Zion glide,
He wales a portion with judicious care;
And "Let us worship God!" he says, with solemn air.

They chant their artless notes in simple guise;
They tune their hearts—by far the noblest aim!
Perhaps Dundee's wild warbling measures rise,
Or plaintive Martyrs, worthy of the name;
Or noble Elgin beets the heav'nward flame,
The sweetest far of Scotia's holy lays:
Compar'd wi' these, Italian trills are tame;
The tickled ears no heart-felt raptures raise;
Nae unison hae they wi' our Creator's praise.

The priest-like father reads the sacred page,
How Abram was the friend of God on high;
Or Moses bade eternal warfare wage
With Amalek's ungracious progeny;
Or how the royal bard did groaning lie
Beneath the stroke of Heaven's avenging ire;
Or Job's pathetic plaint, and wailing cry;
Or rapt Isaiah's wild, seraphic fire;
Or other holy seers that tune the sacred lyre.

Perhaps the Christian volume is the theme:
How guiltless blood for guilty man was shed;
How He, who bore in Heaven the second name,
Had not on earth whereon to lay His head:
How His first followers and servants sped;
The precepts sage they wrote to many a land:
How he, who lone in Patmos banished,
Saw in the sun a mighty angel stand,
And heard great Bab'lon's doom pronounc'd by Heaven's command.

Then kneeling down to Heaven's Eternal King,
The saint, the father, and the husband prays:
Hope "springs exulting on triumphant wing,"
That thus they all shall meet in future days:
There ever bask in uncreated rays,
No more to sigh, or shed the bitter tear,
Together hymning their Creator's praise,
In such society, yet still more dear;
While circling time moves round in an eternal sphere.

Compar'd with this, how poor Religion's pride,
In all the pomp of method, and of art,
When men display to congregations wide
Devotion's ev'ry grace, except the heart!
The Power, incens'd, the pageant will desert,
The pompous strain, the sacerdotal stole;
But haply, in some cottage far apart,
May hear, weel pleas'd, the language of the soul,
And in His Book of Life the inmates poor enrol.

Then homeward all take off their sev'ral way;
The youngling cottagers retire to rest;
The parent pair their secret homage pay,
And proffer up to Heav'n the warm request,
That He who stills the raven's clam'rous nest,
And decks the lily fair in flow'ry pride,
Would, in the way His wisdom sees the best,
For them and for their little ones provide;
But, chiefly, in their hearts with grace divine preside.

From scenes like these old Scotia's grandeur springs,
That makes her lov'd at home, rever'd abroad:
Princes and lords are but the breath of kings;
"An honest man's the noblest work of God!"
And, certes, in fair virtue's heav'nly road,
The cottage leaves the palace far behind.
What is a lordling's pomp?—a cumbrous load,
Disguising oft the wretch of human kind,
Studied in arts of hell, in wickedness refined!

O Scotia! my dear, my native soil!
For whom my warmest wish to Heaven is sent,
Long may thy hardy sons of rustic toil
Be blest with health, and peace, and sweet content!

And, oh, may Heav'n their simple lives prevent
From luxury's contagion, weak and vile!
Then, howe'er crowns and coronets be rent,
A virtuous populace may rise the while,
And stand, a wall of fire, around their much-lov'd Isle.

O Thou! who pour'd the patriotic tide
That stream'd thro' Wallace's undaunted heart;
Who dar'd to nobly stem tyrannic pride,
Or nobly die, the second glorious part
(The patriot's God, peculiarly Thou art,
His friend, inspirer, guardian, and reward),
Oh, never, never, Scotia's realm desert,
But still the patriot, and the patriot bard,
In bright succession raise, her ornament and guard!

SHAKESPEARE

Matthew Arnold, in this fine sonnet, conveys a splendid sense of Shakespeare's eminence over all the master-minds that have written in the English language. "Others abide our question" means that while other great poets or thinkers may be open to criticism or to question, Shakespeare speaks through his immortal verse with so divine a voice that we feel it is the very voice of truth itself and cannot be "questioned."

OTHERS abide our question. Thou art free.
We ask and ask—Thou smilest and art still,
Out-topping knowledge. For the loftiest hill,
Who to the stars uncrowns his majesty,

Planting his steadfast footsteps in the sea,
Making the heaven of heavens his dwelling-place,
Spares but the cloudy border of his base
To the foiled searching of mortality;

And thou, who didst the stars and sunbeams know,
Self-schooled, self-scanned, self-honoured, self-secure,
Didst tread on earth unguessed at—Better so!

All pains the immortal spirits must endure,
All weakness which impairs, all griefs which bow,
Find their sole speech in that victorious brow.

TO A BUTTERFLY

The great poet William Wordsworth, in these pretty verses to a butterfly, gives us the proper point of view from which we ought to regard one of the loveliest of all created things. We can hardly read this poem, entering into the loving spirit of the poet, and then go chasing butterflies.

I'VE watch'd you now a full half-hour,
Self-poised upon that yellow flower;
And, little Butterfly! indeed
I know not if you sleep or feed.
How motionless! not frozen seas
More motionless! and then
What joy awaits you, when the breeze
Has found you out among the trees,
And calls you forth again!

This plot of orchard-ground is ours;
My trees they are, my sister's flowers.
Here rest your wings when they are weary,
Here lodge as in a sanctuary!
Come often to us, fear no wrong;
Sit near us on the bough!
We'll talk of sunshine and of song,
And summer days when we were young;
Sweet childish days that were as long
As twenty days are now.

THY WAY, NOT MINE, O LORD

Dr. Horatius Bonar, who was born in Edinburgh, December 19, 1808, and died July 31, 1889, was a celebrated writer of hymns, which breathe the purest faith and hope. We have chosen the following example of his writings, as it is unrivalled for the expression of the Christian's faith, and ranks with Newman's beautiful hymn "Lead, Kindly Light," which is printed on page 1995.

THY way, not mine, O Lord,
However dark it be;
Lead me by Thine own hand,
Choose out the path for me.

Smooth let it be or rough,
It will be still the best;
Winding or straight, it leads
Right onward to Thy rest.

I dare not choose my lot;
I would not if I might:
Choose Thou for me, my God,
So shall I walk aright.

The kingdom that I seek
Is Thine: so let the way
That leads to it be Thine,
Else I must surely stray.

Take Thou my cup, and it
With joy or sorrow fill,
As best to Thee may seem;
Choose Thou my good and ill.

Choose Thou for me my friends,
My sickness or my health;
Choose Thou my cares for me,
My poverty or wealth.

THE CHARACTER OF A HAPPY LIFE

Sir Henry Wotton was a famous Englishman who lived from 1568 to 1639, and was eminent in the service of his country, being for many years its ambassador at Venice. In the later years of his life he became a clergyman, and wrote a number of essays, chiefly of a religious character. Like most of the scholars of his age, he also wrote poetry. The following is the most remarkable of his few poems; it is worth while to compare it with "Contentment," on page 2648, by Sir Edward Dyer, a poet and statesman of the same time as Wotton.

HOW happy is he born or taught,
That serveth not another's will;
Whose armour is his honest thought,
And simple truth his highest skill!

Whose passions not his masters are;
Whose soul is still prepar'd for death;
Untied unto the world by care
Of public fame, or vulgar breath!

Who envies none that chance doth raise,
Or vice; who never understood
How deepest wounds are given by praise,
Nor rules of state, but rules of good!

Who hath his life from rumours freed;
Whose conscience is his strong retreat;
Whose state can neither flatterers feed,
Nor ruin make oppressors great!

Who God doth late and early pray
More of His grace than gifts to lend,
And entertains the harmless day
With a well-chosen book or friend.

This man is freed from servile bands
Of hope to rise or fear to fall:
Lord of himself, though not of lands,
And having nothing, yet hath all.

THE SPACIOUS FIRMAMENT ON HIGH

On page 568 we gave Joseph Addison's paraphrase of the Twenty-third Psalm, and here we give the same author's paraphrase of the Nineteenth Psalm. In its Bible version this psalm was a great favourite of St. Augustine, and Addison has skilfully retained all the teaching of the original, while expressing it in the modern poetic form.

The spacious firmament on high,
With all the blue ethereal sky,
And spangled heavens—a shining frame—
Their great Original proclaim.
The unwearied sun, from day to day,
Doth his Creator's power display,
And publishes to every land
The work of an Almighty hand.

Soon as the evening shades prevail,
The moon takes up the wondrous tale,
And, nightly, to the listening earth,
Repeats the story of her birth:
Whilst all the stars that round her burn,
And all the planets in their turn
Confirm the tidings as they roll,
And spread the truth from Pole to Pole.

What though in solemn silence all
Move round this dark terrestrial ball;
What though no real voice nor sound
Amidst their radiant orbs be found.
In reason's ear they all rejoice,
And utter forth a glorious voice,
For ever singing as they shine:
The hand that made us is Divine.

LULLABY! O LULLABY!

The writer of the following very popular baby song was William Cox Bennett, originally a watchmaker at Greenwich, where he was born in 1820. He afterwards became a journalist and wrote many songs and sketches, dying in 1895.

Lullaby! O lullaby!
Baby, hush that little cry!
Light is dying,
Bats are flying,
Bees to-day with work have done;
So, till comes the morrow's sun,
Let sleep kiss those bright eyes dry!
Lullaby! O lullaby.

Lullaby! O lullaby!
Hush'd are all things far and nigh;
Flowers are closing,
Birds reposing,
All sweet things with life are done.
Sweet, till dawns the morning sun,
Sleep then kiss those blue eyes dry,
Lullaby! O lullaby!

AMBITIOUS SOPHY

We have already printed two little poems by Mrs. Elizabeth Turner, whose simple verses pleased our grandmothers when they were young. The following is also from her pen.

Miss Sophy, one fine sunny day,
Left her work and ran away;
When soon she reach'd the garden gate,
Which finding lock'd, she would not wait,
But tried to climb and scramble o'er
A gate as high as any door.

But little girls should never climb,
And Sophy won't another time;
For when, upon the highest rail,
Her frock was caught upon a nail,
She lost her hold, and, sad to tell,
Was hurt and bruised—for down she fell.

THE BABY AND THE BROOK

In this very beautiful song, sweet with the fresh charm of Nature, Longfellow, the American poet, has given an English setting to a short poem by the famous Armenian writer named Leon Alishan, which has been popular among the countrymen of that poet for many years.

Down from yon distant mountain height
The brooklet flows through the village street;
A boy comes forth to wash his hands,
Washing, yes, washing; there he stands,
In the water cool and sweet.

Brook, from what mountain dost thou come?
O my brooklet cool and sweet!
I come from yon mountain high and cold,
Where lieth the new snow on the old,
And melts in the summer heat.

Brook, to what river dost thou go?
O my brooklet, cool and sweet!
I go to the river there below
Where in bunches the violets grow,
And sun and shadow meet.

Brook, to what garden dost thou go?
O my brooklet, cool and sweet!
I go to the garden in the vale
Where all night long the nightingale
Her love-song doth repeat.

Brook, to what fountain dost thou go?
O my brooklet, cool and sweet!
I go to the fountain at whose brink
The maid that loves thee comes to drink,
And whenever she looks therein,
I rise to meet her, and kiss her chin,
And my joy is then complete.

BE PATIENT WITH THE CHILDREN

This little poem is anonymous, but the writer was evidently one who had a wonderful understanding of "Christ's little ones."

They are such tiny feet,
They have gone such a little way to meet
The years which are required to break
Their steps to evenness, and make
Them go
More sure and slow.

They are such little hands.
Be kind—things are so new, and life but stands
A step beyond the doorway. All around
New day has found
Such tempting things to shine upon; and so
The hands are tempted oft, you know.

They are such fond, clear eyes,
That widen to surprise
At every turn. They are so often held
To sun or showers—showers soon dispelled
By looking in our face.
Love asks, for such, much grace.

They are such frail, frail gifts,
Uncertain as the rifts
Of light that lie along the sky—
They may not be here by-and-by.
Give them not love, but more, above
And harder—patience with the love.

ASPIRATION.

I know this earth is not my sphere,
For I cannot so narrow me but that
I still exceed it.

LITTLE VERSES FOR VERY LITTLE PEOPLE

Bow, wow, wow, whose dog art thou?
Little Tom Tinker's dog,
Bow, wow, wow.

Dickery, dickery, dare,
The pig flew up in the air;
The man in brown soon brought him down,
Dickery, dickery, dare.

"Croak," said the toad, "I'm hungry, I think,
To-day I've had nothing to eat or to drink;
I'll crawl to a garden and jump through the pales,
And there I'll dine nicely on slugs and on snails."

"Ho, ho!" quoth the frog, "is that what you mean?
Then I'll hop away to the next meadow stream,
There I will drink, and eat worms and slugs, too,
And then I shall have a good dinner, like you."

Peter, Peter, pumpkin eater,
Had a wife and couldn't keep her;
He put her in a pumpkin shell,
And there he kept her very well.

Molly, my sister, and I fell out,
And what do you think it was about?
She loved coffee and I loved tea,
And that was the reason we couldn't agree.

Punch and Judy
Fought for a pie,
Punch gave Judy
A knock in the eye.

Says Punch to Judy:
"Will you have any more?"
Says Judy to Punch:
"My eye is too sore."

Hush-a-bye, baby,
Daddy is near;
Mamma is a lady,
And that's very clear.

There were three sisters in a hall;
There came a knight amongst them all.
Good-morrow, aunt, to the one;
Good-morrow, aunt, to the other;
Good-morrow, gentlewoman, to the third.
If you were my aunt,
As the other two be,
I would say good-morrow,
Then, aunts, all three.

Charley, Charley, stole the barley
Out of the baker's shop,

The baker came out and gave him a clout,
Which made poor Charley hop.

THERE were once two cats of Kilkenny,
Each thought there was one cat too many;

So they fought and they fit,
And they scratched and they bit,
Till, excepting their nails
And the tips of their tails,
Instead of two cats, there weren't any.

CLAP, clap handies,
Mammie's wee, wee ain;
Clap, clap handies,
Daddie's comin' hame;
Hame till his bonny wee bit laddie;
Clap, clap handies,
My wee, wee ain.

LITTLE Bobby Snooks was fond of his books,
And loved by his usher and master;
But naughty Jack Spry, he got a black eye,
And carries his nose in a plaster.

PUSSY-CAT MEW jumped over a coal,
And in her best petticoat burnt a great hole.
Poor Pussy's weeping, she'll have no more milk,
Until her best petticoat's mended with silk!

LAVENDER blue and rosemary green,
When I am king you shall be queen;
Call up my maids at four o'clock,
Some to the wheel and some to the rock,
Some to make hay and some to shear corn,
And you and I will keep ourselves warm.

A NICK and a nock,
A hen and a cock,
And a penny for my master.

As I was going to sell my eggs,
I met a man with crooked legs;
Crooked legs and turned-up toes,
I tripped up his heels, and he fell on his nose.

ROBIN-A-BOBIN
Bent his bow,
Shot at a pigeon,
And killed a crow.

JACK SPRAT had a pig, who was not very little, nor yet very big;
He was not very lean, he was not very fat;
He'll do well for a grunt, says little Jack Sprat.

A TALE OF THE MIDDLE AGES

THE story of the life of Charles Reade, the novelist, is briefly told on page 2314. As there stated, Reade does not rank with the greatest story-writers in the English language, though he wrote many excellent novels and plays. But his best book, "The Cloister and the Hearth," is certainly a fine historical tale, even if it is not so great as the best of Sir Walter Scott's, or cannot be compared with Thackeray's "Henry Esmond." The story is partly founded on fact, but its real interest lies in the masterly way in which the author shows us the contending influences of "the cloister," which stands for the monkish life, and "the hearth," which stands for the life of the home circle and the love of our relatives and friends.

THE CLOISTER AND THE HEARTH

CONTINUED FROM 3930

IT was past the middle of the fifteenth century, when Philip "the Good," by means not exactly honest, had been for many years ruling over Holland, that a well-to-do trader in cloth and curried leather, named Elias, together with his wife Catherine and their family, lived in the little town of Tergou, no great distance from the important city of Rotterdam.

The time had been when the nine children of Elias and Catherine had made merry music in the home, shedding brightness and happiness. But as they grew up, their various natures led them in different directions, and they brought sorrow and trouble where before they had made sunshine.

When our story opens, four of the family had left home, and were settled in various occupations, but five remained at Tergou. Giles, the dwarf, was a strange, passionate little creature with a shock of red hair, while Catherine was a poor little girl who could only move on crutches, but smiled through her pain and never spoke a fretful word. These two were unable to earn their bread, but the two others were unwilling. The unwilling ones were Sybrandt, the youngest, whose only desire was to pass his time in idleness or play, and Cornelis, the eldest, a mean, grudging fellow, who would not exert himself to advance his father's business, but was waiting for him to die, so that he might lay hands on his money. Time, however, played a game with him in which Cornelis was not the winner.

If their parents had but small comfort in contemplating these four of their children, and thought of them always with misgivings, they usually concluded in a hopeful tone by saying: "But, thanks to St. Bavon and all the saints, there's Gerard."

For Gerard's future they had no fears, if they had no great hopes, as he was destined for the Church, having been carefully taught by the monks of a local convent. He was a skilled penman in an age when very few could write, and the ability to do so was considered a great accomplishment. But, more than this, there had settled at Tergou a certain Margaret van Eyck, sister of two famous brothers whose paintings are among the greatest treasures of European art to-day, and she taught Gerard the art of illuminating manuscripts in colours, at which he quickly became an adept. He was of a bright and happy nature, and if his thoughts were at all bent towards the life of a priest, that was less of his own free will than of his parents' wish.

Now, however unworthy the means by which Philip the Good had succeeded in imposing his rule upon Holland, the prince was at least a patron of the arts, and at Rotterdam he held a great exhibition, inviting all sorts of craftsmen and art-workers to compete for prizes which he offered. So Gerard sent in specimens of his illuminating and writing on vellum. On the day when the prizes were to be distributed, dressed in his finest

clothes, and carrying a letter to the young Princess Marie from his teacher, Margaret van Eyck, he set out with a light heart and high hope for Rotterdam. Of all the many journeyings of his life, this little journey was to prove the most eventful. On the way he fell in with an old man, accompanied by a beautiful daughter. They were evidently poor, and sat by the wayside exhausted. Gerard's kind heart was touched for them, and he shared his food with these weary wayfarers.

WHY THE BURGOMASTER OF TERGOU HAD AN UNEASY CONSCIENCE

It so happened that while he was sitting with them, there passed by, riding on a richly caparisoned mule, the Burgomaster, or Mayor, of Tergou. This person, Ghysbrecht van Swieten, was a notorious miser, and his withered old crab-apple face was a veritable symbol to the people of Tergou of all that was mean and niggardly. But today he was riding along in quite a self-satisfied manner, for he was to sup with the duke at Rotterdam.

As he came upon the little group by the wayside, however, the smile on his face changed suddenly to an expression of anger and uneasiness. He alone, with his guilty conscience, knew the reason of this. Some twenty years before, by an act of dishonesty, he had succeeded in enriching himself at the expense of this simple old man by the roadside, and when he saw Gerard, young, active, and educated, in the company of Peter Brandt and his daughter Margaret—for these were their names—his suspicious mind at once had thoughts that Gerard might have discovered his secret, and would help his victims to get back the property he had wrongfully withheld from them.

GERARD WINS A PRIZE AT ROTTERDAM, BUT LOSES HIS HEART

With these uneasy thoughts, the burgomaster continued on his way, while Gerard and his companions, all unconscious of Ghysbrecht's suspicions, made slower progress to Rotterdam. Here the hopes of the young man were fulfilled, as he found himself the winner of the prize for penmanship, and had a gold medal pinned on his breast and fifteen golden coins put in his purse. Not only this, but, thanks to the letter he carried, he had been warmly received by the Countess of Charlois and her daughter, the Princess Marie, and the countess promised he should have the gift of a church the very day after he had said his first Mass, for in those days the Roman Catholic Church was supreme. The Princess Marie would have had him a bishop at once, but her mother's promise was the easier to keep.

It would have been with the lightest of hearts and the briskest of steps that Gerard made his way back to Tergou, had he not, during his visit to the palace at Rotterdam, lost trace of Peter Brandt and Margaret. So charmed had he been with the old man's beautiful daughter, that the thought of not seeing her again made him sad. He had foolishly forgotten to ask their names or where they lived.

But he had not been long returned to his home before these were disclosed to him in a curious way. The burgomaster, keen to discover what Gerard knew about his relations towards the Brandts, sent for him on pretence of requiring him to copy out the town records. But the payment he offered for the work would barely have bought pens, ink, and parchment, and Gerard protested that he required some reward for the time the writing would occupy.

THE WILY BURGOMASTER IS TOO CLEVER AND OUTWITS HIMSELF!

"Your time? Why, what is time to you at two-and-twenty? Say, rather, you are idle grown. You are in love. Your body is with these chanting monks, but your heart is with Peter Brandt and his red-haired girl."

"I know no Peter Brandt."

"Ye lie!" shouted Ghysbrecht. "Did I not find you at her elbow on the road to Rotterdam? And were you not seen at Peter's house at Sevenbergen the other day?"

Thus hoping to draw the young man to a confession, the burgomaster had only given him the information which Gerard most wished to have. Leaving Ghysbrecht's house, he set out forthwith to the neighbouring town of Sevenbergen, bent on renewing his acquaintance with Margaret and Peter.

The burgomaster had sent a servant to spy upon Gerard, and when he heard whither the young man had gone, his worst suspicions seemed to be confirmed. So now he set himself to work against him by informing Elias and Catherine

of their son's movements, telling the father that unless he adopted strong measures he would never see his son a priest, as he was in love with Margaret.

Gerard was truly in love with Peter's daughter, and when charged with it by his father, he frankly acknowledged that it was his hope to make her his wife and never to become a priest. Elias then told him before them all that he had ordered the burgomaster to imprison him in the town gaol rather than let him marry Margaret. On hearing this, Gerard made a vow that he would never become a priest so long as Margaret lived.

In his trouble Gerard went to his gentle teacher, Margaret van Eyck, and she advised him to have but the courage to marry Peter's daughter and go away to Italy, where painters were honoured as princes, and penmen were paid large sums of money for copying manuscripts. She even offered to find him the means of travelling. Gerard was determined, and though Margaret at first refused, she, too, was soon persuaded, and the banns of marriage were duly proclaimed.

At ten o'clock one morning, Gerard and Margaret took their places before the altar in the church of Sevenbergen, and the priest was just about to begin the religious ceremony, when the constables of Tergou came hurrying up the aisle and carried Gerard off a prisoner.

His father had kept his promise. For Gerard now found himself lodged in the town gaol, where he was told by the burgomaster that he would remain a prisoner until he made an oath to leave Margaret Brandt and return to the Church to which he had, in a manner, belonged from his very cradle.

GERARD ESCAPES FROM THE TOWER

As Gerard was determined not to fulfil his parents' wishes by becoming a priest, but to marry his sweetheart, Margaret Brandt, his father, Elias, had him imprisoned in the tower of the Tergou Town-hall, but Gerard escaped by means of a rope sent to him in a very strange way.

"Death sooner!" was Gerard's only answer to Ghysbrecht's threats.

The cell in which he found himself lodged was high up in a tower, and although the window was easily reached, it gave no hope of escape, as there was no possible means of descent, and a fall meant certain death. The apartment was bare of furniture, save for an old oaken chest, on which Gerard was seated, hungry and despairing, when, to his surprise, something struck the wall beyond him, and fell at his feet. It was an arrow, to which a skein of silken thread was fixed, and on which these strange words were written:

"Well beloved, make fast the silk to thy knife, and lower to us; hold thine end fast, then count an hundred, and draw up."

In a sudden access of renewed hope, Gerard pushed the great oak chest towards the window, and, hastily following out the instructions, pulled up the silken thread again, to find attached to it a line of thin cord, which, when he had hauled it in, brought up the end of a good stout rope. This he passed through the handles of the chest, tying it securely, but before venturing through the narrow window, he sought to make sure that the chest was sound, and, jumping on it with all his force, to his surprise, the side opened, and a great store of parchments fell out. Unwittingly he had touched some secret spring, but he did not pause to examine the contents. Satisfied with the strength of the chest, he now forced his way through a window, and, passing down the rope, was safely received below by Margaret Brandt and Martin Wittenhaagen, an old soldier who was a warm friend of the

Brandts, and whose well-shot arrow had opened the gates of Gerard's prison.

As the trio were hastening away from the scene, they were amazed, on looking back, to see a strange figure with a head of fire ascending by the rope down which Gerard had come. For a moment Martin was filled with superstitious fears of the "haunted tower"—for it had that reputation—but another figure stood below, white and motionless. Margaret, with her woman's instinct, thought of Gerard's sister Kate, and, running to the figure, found it was she. Gerard, too, came forward, just as a strange, weird voice high up the tower was shouting: "Parchment, parchment, parchment!"

High up they saw the little figure of Giles, the dwarf, a lighted lantern hung at his neck, and his hands full of parchments, which he hurled down in bundles on their heads. When he had thus thrown out the contents of the chest, he slid down the rope himself, and, in his half-witted enthusiasm at the find he had made, offered to sell this unexpected stock to Gerard, for whom he had often found parchment.

GERARD'S ESCAPE FROM THE TOWER AND HIS PURSUIT IN THE FOREST

"Hush! You speak too loud," said Gerard. "Gather them up and follow us to a safer place." And, giving poor Giles a few coins, Gerard took the bundle, making all speed to Sevenbergen with Margaret and Martin.

There was great commotion the next day, when it was found that the burgomaster's prisoner had escaped and that the parchments had disappeared. His servant set out in pursuit, but failed to find the runaway. So, the day after, Ghysbrecht, with his constables, rode over to Sevenbergen, only to find Peter's house deserted. From an upper window, however, the burgomaster caught a glimpse of Gerard and Margaret, accompanied by Martin, making for the forest, and immediately with his men he gave pursuit.

The burgomaster, on his mule, was the first to come up with them, but Gerard disabled him with a blow from his oaken staff, and presently the three had gained the forest, where Martin led them by puzzling paths into a thick pine-grove, where their pursuers were not likely to penetrate.

In the excitement of having beaten down his enemy, Gerard was inclined to be proud of his feat, but his gentle heart was soon chiding him, and he now found himself hoping that he had not injured the old rascal very seriously. Another moment, however, and the fugitives had to think of themselves again. A deep baying sound coming through the woods proved that they were being pursued by bloodhounds.

PURSUED BY BLOODHOUNDS, BUT SAVED BY MARTIN'S BOW AND ARROW

Presently one of these fierce and ravening animals burst through the trees into the open wood, where Martin had now led his companions. But the deadly arrow of the old soldier laid the bloodhound lifeless on the ground, and a second animal that followed on the heels of the first, stopping for a moment to sniff around its dead companion, also fell a victim to Martin's bow.

Saved from this terror, the three now threaded their way through the forest, only to find the burgomaster, seated on his mule and with a rough bandage across the lower part of his face, which had suffered severely from Gerard's attack. He was keeping watch on the likeliest place for them to leave the forest, but in a few moments Gerard disposed of him, by knocking him off the mule, upon which Martin mounted with the half-fainting Margaret. With the active Gerard running beside, they soon outdistanced their pursuers and reached the German frontier. Here Gerard took a heartbroken farewell of his wife, and leaving her in charge of the good archer, who promised to see her safely back to Sevenbergen, he struck over the border and began his long and eventful journey to Rome.

WHAT HAPPENED AFTER GERARD'S FLIGHT FROM HOLLAND

He had no lack of adventures by the way, found strange companions, suffered many trials, worst of all, his parting from a bluff, hearty soldier named Denys, with whom he had become very friendly. But we will leave him on his way into Italy and follow the fortunes of Margaret meanwhile.

Martin Wittenhaagen had safely escorted her back to Sevenbergen, and then going straight to Rotterdam, laid the whole affair before the duke, returning home with a free pardon for

himself and Gerard. But the excitement she had come through resulted in Gerard's bride being taken with a fever, in which she was nursed by her good friend, Margaret van Eyck.

A friend of that lady, who had been a pupil of her famous brother Jan, and who was himself to become one of the greatest of the Flemish painters, Hans Memling by name, was now about to start for Italy, that wonderful land of painters and poets, and to him a letter was entrusted for Gerard. Hans, unhappily, gossipped in one of the taverns in Tergou about this letter, and one of those who heard him was Gerard's youngest brother, Sybrandt, who told Cornelis, and together they plotted how they might manage to keep their brother in Italy, and so share his inheritance.

They found in the burgomaster a willing accomplice, as that old miser had now good cause for hating Gerard, especially as he discovered that the runaway had carried off a parchment relating to Ghysbrecht's transactions with Margaret's grandfather, which proved that the burgomaster had robbed her and her father of their property. Gerard had taken it away with him, saying that, as it was not a town record, he would read it at his leisure.

GERARD THRASHES THE BURGOMASTER

The Burgomaster of Tergou, with his constables, pursued Gerard, who had escaped to the forest with Margaret and Martin, the bowman; but, coming alone upon the runaways, the burgomaster was speedily disabled by Gerard, and his mule was seized to help the fugitives in their escape.

So Ghysbrecht, all too readily, joined with Cornelis and Sybrandt in their plot against Gerard, and, writing a letter, he imitated, as well as he could, the handwriting of Margaret van Eyck, saying in it that Gerard's young bride had died of a fever. This letter the brothers managed to substitute in the wallet of Hans Memling for the true one, and so began all the tragedy of the story.

Meanwhile, Gerard had taken ship from Venice, bound for Rome, and, suffering shipwreck, had narrowly escaped with his life. Rome, however, he reached at last, and not without friends; for he had been the means of saving a woman and her child, whose home was in that city, and also a great, burly Dominican monk who was bound thither.

The name of the woman he had saved was Teresa; and her husband, Ludovico, out of gratitude to him, secured Gerard an interview with Brother Colonna, a famous friar of the Dominican order, to whom Gerard submitted examples of his beautiful penmanship in Greek and Latin, and his illuminating. Delighted with this work, the friar sounded his praise among all the learned people of Rome, and very soon the art of the young man from Holland was in such request that he was in a fair way of making his fortune by his clever pen. Among those who employed him was a certain Princess Clælia, who not only admired his art, but fell in love with him; and if Gerard could have forgotten Margaret he might have risen, by Clælia's help, to fame in Rome and lived in luxury. But the princess, being of a passionate nature, and accustomed to have people do as she wanted, when she found him cold towards her, threatened in her anger to have him assassinated. So he told her the sad story of his leaving his native land, and how he had surrendered everything for Margaret's sake. The princess then advised him to quit Rome at once, saying: "Go! I will send you the means. If you cross my path again I shall kill you! Farewell! My heart is broken."

It was soon after this that, in a very gloomy frame of mind, Gerard one day

found himself deciphering the contents of the parchment he had carried away with him from Tergou. To his amazement, he realised that it dealt with a loan of money granted by Ghysbrecht to Margaret's grandfather against the rents of certain land, but which loan must have been repaid many times over. The old miser had illegally kept the property, thus impoverishing Peter Brandt and Margaret.

HANS MEMLING'S VISIT TO ROME AND THE FATEFUL LETTER

"Fool," he cried aloud, "not to have read this before!" Fool, indeed, and tardily awake to his foolishness. But now he was all activity, and, taking horse, he rode to the nearest port whence he could engage a passage to Amsterdam, meaning to clear up his affairs in Rome and to return to Holland at once.

On coming back from his errand, however, his landlady gave him a packet of silver crowns, together with a letter which Hans Memling, who had called in his absence, had left for him. Seizing the letter, he began eagerly to read it aloud, his voice changing presently to tones of terror, for it was the false story of the death of Margaret.

"It is a lie!" he cried, when he had read the bitter epistle to the end. "Where is this Hans? I will cram his murdering falsehood down his throat!" So saying, he fled from the house, and in the agony of his mind went furiously and aimlessly about the streets for hours before returning to his lodging.

GERARD'S DESPAIR AND HIS NARROW ESCAPE FROM DEATH

There he fell into a fever, which continued many days. And when he came to consciousness again, it was to find Brother Colonna, accompanied by Brother Jerome, the Dominican friar whom Gerard had helped at the time of the shipwreck, seated by his bed. They tried to console him, and spoke of the consolations which the Church had to offer to the wounded spirit and the bruised heart; but Gerard, in the deep dejection which had now come upon him, no longer doubting that the news was true, was in revolt against all suggestions of religion, and blindly furious at his unhappy fate.

When his strength had returned and he was about again, instead of turning his thoughts to the Church, he sought to forget his unhappiness by sharing in the gay life of Rome, which was then at its gayest under the Papal rule.

His companions now were fellows of bad repute; and once, when with a reckless company boating on the Tiber, he passed the Princess Clælia. She, recognising him, was mortified to think that he should prefer such company to her own, and, her jealousy aroused once more, hired an assassin to kill him. This assassin was none other than Teresa's husband, and when he found whom he had to kill he could not do the deed. Instead of killing Gerard he saved that unhappy man from drowning in the Tiber, and on his way to his own house, carrying the dripping form of Gerard, he was hailed by Friar Jerome as he passed the monastery gates. That burly monk, recognising Gerard's face, bade Ludovico carry him into the building. Thus, when Gerard awakened to consciousness again, the Dominican monk was by his side.

THE TRAGEDY OF THE LETTER MAKES A PRIEST OF GERARD AFTER ALL

And now he was no longer angry at the consolations of the Church, nor adverse to the thoughts of a monkish life. Indeed, he was soon persuaded that peace of mind and rest for his troubled spirit were to be found only in the fraternity of St. Dominic; and so, in due course, Gerard took the vows, and became a friar under the name of Brother Clement.

Our story now shifts back once more to those whom Gerard had left behind in Holland. There in Rotterdam there was another Gerard now, a little boy born to Margaret, named after the father who had never seen him. Denys, the jolly soldier, had gone away to Burgundy, and Margaret, working as a laundress, was struggling to support her aged father. Poor though they were, she might have been happy if she had but news of Gerard.

The birth of little Gerard had a curious effect in making Ghysbrecht, the burgomaster, strangely uneasy about the wrong he had done to Peter Brandt and his daughter. Parched and dry though his soul must have been, his conscience pricked him when he realised that he stood the robber of three generations, and that he had written the lying letter which was keeping

Gerard in Italy under the impression that Margaret was dead, and that nothing made it worth his while to return to Holland now. The slightest suspicious word from anyone made the old fellow tremble at the thought that his secret had been guessed, and his days were filled with gloomy forebodings. Yet old Peter was left to slip away unconscious of how his inheritance had been kept from him.

Our story changes once again, and now the scene is the famous River Rhine, down whose stream and along whose banks two missionaries are journeying. On their way they preach in the churches, and have eager audiences, for both are eloquent and seem imbued with the spirit of the Gospel. Their purpose when they reach the city of Rotterdam, at the mouth of the Rhine, is to take ship for England, there to continue the work they have just begun.

But on their way they have parted company for a time, meaning to meet again at Rotterdam. Perhaps the fact that Brother Clement's sermons seem to have stirred the people more deeply than Brother Jerome's has had something to do with this parting of their ways, for even preachers can be jealous of each other's powers. So that when Clement arrives at Rotterdam and inquires of the monks there about his old companion, they point out to him a ship which has just left port, and can now be seen making full sail towards England.

"What, gone without me? Oh, Jerome, Jerome!" Clement exclaimed.

"Then you must be Brother Clement," said one of the monks, handing him a letter from Jerome, in which the writer told him that he might follow to England if he pleased, but that it would be better to stay behind and preach to his own countryfolk.

This was indeed a cruel cut to Brother Clement; but his heart was now in his work, and next Sunday he preached a splendid sermon in the church at Rotterdam. Here he learned news that shocked him, when he was told that Peter Brandt was dead and buried, and that Margaret still lived.

The person who had told him had been a servant of the burgomaster. He did not recognise in Brother Clement Gerard of Tergou; and when he went on to tell the monk that he also knew of Ghysbrecht's perfidy in having supplied the false letter to Gerard's brothers, the monk started up wildly, and, rushing headlong down the street with clenched hands and blanched face, seemed like one gone mad.

THE DEATH OF MARGARET

The plague broke out in the town where Margaret's son was at school, and, hastening to take her boy away, she caught the disease. Gerard arrived only in time to perform his priestly duties at her deathbed.

As the other stood amazed at the strange result of the story he had told, his arm was grasped by a trembling hand, and Margaret stood beside him. When he told her in a few rambling sentences what had passed, she cried, in an excited voice:

"Oh, what have you done? See you not this is Gerard? Quick! Quick! Help me to Elias, for the power has all gone out of my body!"

At supper-time, when the family had assembled around the board at Gerard's old home, it was not Margaret who came in to take her vacant place, but a Dominican friar, livid with righteous rage. Stooping over the table in front of Cornelis and Sybrandt, he shrieked aloud the most terrible words of agonised reproach, to which the perfidious brothers listened in terror and dismay, and,

cowering and shuddering, almost hid themselves beneath the table, while Gerard tore a letter from his bosom and flung it down before his father.

"Read that," he said sternly, "thou hard old man, that didst imprison thy son. Read and see what monsters thou hast brought into the world. The memory of my wrongs and hers will dwell with you all for ever. I will meet you again on the Judgment Day. On earth you will never see me more."

GERARD LEARNS THE TRUTH & MARGARET GETS HER FORTUNE TOO LATE

And in a moment, as he had come, so he was gone, leaving them stiff and cold and white as statues.

Rushing from the house, white and raging, Gerard passed Margaret on her way thither, but stayed not his frenzied haste; while within the house old Elias in his wrath would have killed his two evil sons had they not escaped.

The rest of the story is soon told, for all its tragedy is now before us, and nothing remains but resignation and devotion to a new ideal for its chief actors.

The burgomaster lay dying when Gerard went to see him at Tergou, intent on making him restore to Margaret her fortune, which he did, with added interest, for all the years he had wrongfully retained it. But when Margaret looked on her wealth with wondering eyes, her only words were: "Too late! Too late!" Nor did the inheritance of the property of Margaret van Eyck, who died soon after, help to dispel the cloud that had now settled upon her life for ever, for Gerard had disappeared again, as soon as he knew that Margaret was relieved of all worldly need, and she thought him hard of heart to show no wish to meet her or their child, forgetting, perhaps, the impassable barrier now between them.

HOW THE PRINCESS MARIE KEPT HER WORD TO GERARD

But when the Princess Marie heard that Gerard was now a priest, she fulfilled the old promise, and appointed him Vicar of Gouda. Meanwhile, however, the monk had been living as a hermit in a cave at Gouda, and took much persuading before he could be got to go and live in Gouda Manse, where, no longer Brother Clement, friar and hermit, he stood forth as Gerard Eliassoen, Vicar of Gouda. Many serene and peaceful years were now to be lived by Gerard and Margaret, who, though restored to each other, could never be united. He attended to his priestly duties, and she to the rearing of their son and the help of the poor.

As little Gerard grew up he was sent to one of the most famous schools, and great things were expected of him, so bright was his intelligence. But the plague broke out in the town where his school was, and Gerard hastened over to bring the boy away, only to find that Margaret had been there before him, and had sent her son safely off to Rotterdam; but she herself fell ill.

Gerard was thus little more than in time to be with her, and comfort her in her last moments. He read the service at her grave with scarcely a tremor in his voice. But at the sound of the earth falling upon the coffin he uttered a piercing shriek, saying to a friend who stood beside him: "Ah, Jorian, something snapped within me! I felt it, and I heard it. Here!" And he put his hand to his breast.

HOW GERARD'S LIFE WAS ENDED IN THE CLOISTER AT GOUDA

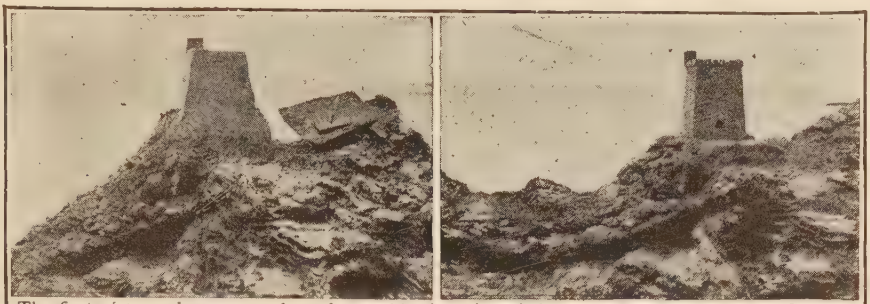
It was no more than a fortnight later that Gerard himself, broken in body as well as in heart, sought refuge in the Dominican convent near Gouda, and wished to be accepted there as a new brother who had come but to die.

The temporary prior of the convent was one named Brother Ambrose, who, on seeing Gerard, exclaimed, "Clement!" and Gerard said, "Jerome!" for it was his companion of many years ago.

When Gerard died, a few days later, under his linen was found a horse-hair shirt, and under that a long tress of auburn hair; and when the coffin was to be closed, Jerome cleared the cell, and put the tress of hair upon the dead man's bosom.

Elias and Catherine lived to a great age, so long, indeed, that both Gerard and Margaret grew to be dim memories to them; while the yellow-haired laddie Gerard Gerardson belongs not to fiction, but to history, as he lived to be the first scholar and divine of his epoch, and was also the heaven-born dramatist of his century; for under the name of Erasmus he became, and is remembered for all time, as one of the world's great men.

The next Famous Books are on page 4063.



The first picture shows a sand castle roughly shaped, and the second picture the castle finished.

BUILDING SAND CASTLES

CONTINUED FROM 3922

One of the delights of a seaside holiday is the building of sand castles on the beach. But we need not be content with what is usually called a castle—that is, a great pile of sand heaped up with little regard to order. We can, with skill and patience, make a really good model of a castle, like that we see upon page 4026.

First of all we must choose a suitable spot, where there is plenty of clean, damp sand, and pile the sand up into a heap something after the shape of the castle we wish to build. To begin with, we can do something simple, such as a round tower, or perhaps a castle gateway. While piling it up, we must beat it well together, so as to make it all as firm and solid as possible; especially must it be well pressed together at the top if we are going to cut out embrasures on the battlements.

If the day is hot, or the sand dry, it will be well to moisten the rough heap, either from a watering-can with a sprinkler or by carefully splashing the water on by hand from a pail or other vessel. The heap must not be wetted too much, or the walls will collapse. After a little practice, we shall be able to judge how wet the sand must be to make it bind well together, but we shall always see signs of too much damp near the foundations first. The heaping up is best done with the spade, and it is well, in the case of a small castle or specially fine work, to pile it on in handfuls, patting it down carefully so that there are no cracks or flaws. Stones, shells, or bits of seaweed must be avoided.

The carving out is roughly done at first until about the right shape is obtained, and then, beginning from the top, the work is finished off till the bottom of the walls and the ditch claim attention.

A small spade can be used for the rough shaping, but the final trimming needs a smaller tool. A kitchen knife is suitable, and with this the sand is literally cut into shape. When using these tools, we must always remember to make a slicing cut, especially when carving near corners, or the edge of the work will be broken away in pieces.

Let us take, as an illustration of the proper methods of sand-working, the building of a tower with battlements. The moulding being done, we first trim off the upper part till it is level all round, and then mark out the top with a knife to show where the openings will come. Having divided it up equally—that is to say, with the openings at regular intervals—we make slicing cuts with the knife, always inwards, to the right depth, and then lift out the cut parts on the knife, thrusting it in from the front. If we do this neatly with a steady hand, those parts of the castle will not need touching again. If, however, pieces are broken away, they can be replaced without much trouble.

When the openings are cut, the battlements must be trimmed to the right thickness, and the centre dug out to form the flat roof. We must do the digging towards the centre, so that no pressure is put on the battlements, or they will be easily broken away. For all digging-out operations, making archways or tunnels, an iron spoon is an invaluable tool.

The battlements being complete, the lower work may now be proceeded with. We cut the walls nearly straight down, roughly at first, and then mark out where the cornice of the battlements will come, for an overhanging cornice adds much to the appearance. The line must be straight, and it is well to use a lath of wood as a ruler if it is at hand; we now cut down at the proper angle, and trim off the sand below, until the walls are even and vertical.

After trimming, the walls will need to be provided with some windows and, perhaps, arrow-slits. We mark out the windows with a point before cutting, so that we can see that they are level and in the right places. If we make mistakes in marking out, the marks can be erased by rubbing with the finger. When ready, they will be

BUILDING A SAND CASTLE ON THE BEACH

A bucket and spade, a supply of moist sand, and willing hands with plenty of patience are all that is necessary for the making of a fine castle by the sea. Here we see the builders beginning the walls and towers.

The arch for the gateway is one of the most difficult parts of the building. The sand must be made very wet, so that it will "bind," and not fall down upon the garrison or guests, whom we have to imagine as passing in and out.

Patience and skill have at last won a triumph for the bucket and spade; and here we have the noble ramparts of a castle. Any number of fairy soldiers might keep guard behind those sturdy walls; and the little crannies are each the hiding-place of a bowman ready to let fly his arrow at any enemy who may appear.

These three photographs of sand castles and those on page 4025 are by Mr. W. P. Adams.

cut in deep and dug out with a knife if small, or with a spoon if large; care has to be taken lest the edges of the opening are broken. Arrow-slits, if small, can be made with the end of a knife dug in deep and moved from side to side before pulling out.

The arched entrance is made in much the same manner as the windows, only, as it will be tunnelled in deep, or perhaps right through the wall, a spoon with a long handle will be useful.

If the back of the wall is to be trimmed down or cut thin, it should be done after the front is finished, and probably will need to be done only roughly; but we must be very careful not to be in too much hurry, and trim it off little by little, always letting the pressure of the tool fall on the sand to be removed, and not on the finished work. If all this is done intelligently, it is really quite wonderful what high, thin walls can be made. But do not be too ambitious at first; good stout walls, with one side carefully finished, will be best till practice makes perfect.

If we look at the pictures on the top of page 4025, we can see how the castle appears during the course of construction and when it is finished. The tools can be seen on the right of the first picture—a square of stout cork linoleum picked up on the beach, with which the sand was lifted on to the rock; the end of a small wooden box, also picked up on the beach, which served as a spade; and a small 4-inch steel rule and a pocket-knife.

When building on rock foundations, several difficulties have to be guarded against. When working with wet sand, the tendency is for the water to filter down to the bottom, especially as the sand is patted and pummelled a good deal, and as it cannot soak away at the base, as is the case when building on a sand foundation, it collects when it reaches the rock, and the mass will divide in two, owing to the sand running away.

To prevent this difficulty, or to remedy it if it arises, several methods are available. If there is any question as to the sand being too wet at the start, it will be well to begin with some fairly drys and at the foundations, using wetter sand near the top. If, after the work has proceeded some time, there is evidence of the base becoming too wet, take out a few handfuls close to the rock and replace it with drier sand. Another plan is to surround the base with quantities of dry sand, to soak up the water, which can be easily cut away as the work proceeds. Perhaps this last method is the best for a young builder of sand castles.

SOME GAMES PLAYED WITH HOOPS

A HOOP RACE

A WINNING-POST is fixed upon, and all the runners stand with their hoops in a row, waiting for the word to start. Then away they go as fast as they can, bowling their hoops, and the one who reaches the winning-post first with his hoop wins the game. A very good way to add to the fun is for everyone to change hoops just before starting on the race, and to make it a law that the last hoop to reach the goal wins. Each player will try his best to get in front, hoping that the one who has got his hoop will be left behind.

TURNPIKES

IN this game a course is mapped out on the field, and, at certain distances apart, short sticks, with an inch or two of space between them, are stuck side by side into the ground. These are "turnpikes," and if no sticks are handy, bricks or stones may be used instead. The players take hoops and bowl them round the course, steering them through the turnpikes, but should they, in passing on either side, touch one of the pikes, it will count as a mark against them. When the course has been travelled over three times, the number of bad marks against each player is counted, and the one with the fewest marks is the winner. The players must not walk, and should not go slower than a trot.

HOOP PARADE

THIS game might be called "follow my leader with a hoop," and when carefully played makes a pretty pastime for girls or boys. The more that join in it the better the effect. The leader starts off with her hoop at a trot, taking a circular course, and all the others follow behind her. By quickening the speed she presently comes up behind the last girl in the row, and a large ring is thus formed. Then suddenly she turns her hoop to one side and makes another ring, only in an opposite direction, much as we write the figure 8. This may be kept going for some little time, or varied as the leader's ingenuity can suggest. Of course, all who take part in this game should be more or less skilful hoop-bowlers.

HUNT THE STAG

WE want plenty of space for this game and plenty of players. The best runner, who is called the stag, is chosen, and allowed a few moment's start with his hoop. Then away go all the hounds after him, also bowling their hoops, and if the stag knows how to dodge, he may make the others quite breathless before he is caught.

POSTING

THE players stand in a large circle, some yards apart, their separate "stations" being marked by a stick or a stone. Number 1 has all the hoops, and starts the game by running toward her next neighbour, bowling the first hoop as she goes. When half-way she stops, gives the hoop an extra push, and runs back to her station for the next hoop. Meanwhile number 2 has started on with the first, which she bowls to number 3, but she must be back in time to receive the second. Thus, one by one, all the hoops are set in motion, each player running backwards and forwards between her next neighbour and her own station. With care and skill the hoops may be kept going round the circle for some time, but a single mistake means the end of "posting," for where *all* the hoops are in motion it is not possible to make up any lost time.

A USEFUL LITTLE CROCHET PURSE

A SAFETY purse must be used in order to appreciate its usefulness. It is called "safety" because when once the money is dropped in between the chains at the opening, it cannot possibly fall out; it is generally worn round the neck on a crocheted chain, and tucked into a fold in the blouse or the waistband.

We can, of course, make the purse any size we like. That shown in the picture is a large one, about five inches by three and a half inches. It is made of shaded yellow mercinette at 15 cents a ball, and crocheted with a steel crochet hook, size No. 3, in the form of a long strip, about one-third of which forms a flap to cover the opening.

We start by making fifty-six chain stitches —if we have not done any crochet work before, we should turn to page 1348— then make three extra chain stitches for the turning, and put one treble stitch into the fourth chain back.

Next we crochet one chain, then put one treble stitch into the next chain below; repeat that into the next chain, again crochet chain, miss a stitch below, and thus repeat one chain two treble to the end of the original chain.

Before turning to work back again, we crochet three chain to form a turning, reverse ends and put two treble into the first large hole below; then crochet one chain over a missed stitch below, and repeat this to the end of the row.

We make thirty-five rows like this, and, without breaking off the thread, start making chains along the edge of one end. These chains are for the purpose of closing the purse.

THE CROCHET PURSE COMPLETED

If we make fifteen long chains into loops along one end, and draw the loops through the row of holes lying nearest when the strip is folded up, the ends of the loops can be crocheted into a ring at the back of the purse. Another crochet chain is then put through the ring, and passed over the head so that it can hang round the neck.

Now to return to our chains. It will help us to strengthen the edge of the opening, if, while making these chains, we crochet along it; so we make two single stitches into the two chain between the large holes, then draw down the thread through the large hole, and at once start making a fifty-six chain. This chain is very simply made— by taking a single stitch through the same large hole, followed by two single stitches into the two chain along the edge.

Having thus made and attached the looped chain, and without breaking off the thread, we fold up the end of the strip with the chains attached and drag these through a row of holes with the crochet hook, the part above the holes serving as a flap to the purse.

Evidently the next thing to be done is to crochet together the doubled-up edge of the strip on the side where the thread now is. That we do by pressing the two edges together between the left thumb and first finger, so that two stitches are side by side, and then crochet single through the two.

At the end we have to break off our thread by making one extra chain stitch, drawing the thread through, cutting it, and pulling it taut. The loose end is drawn through two or three stitches to hide it. We next join the edges of the opposite side, and continue crocheting round the flap to give it a firm edging.

Lastly, we crochet a little chain of suitable length for a ring, join it up, and double crochet into it all round, drawing into each stitch the looped chains until the fifteen are exhausted.

The purse itself is now finished, and all we have to do is to suspend it round the neck by a long crocheted chain.

As this purse is a large one, and quite a small purse may be preferred, a useful small bag is made on a chain of thirty stitches with three added for turning, and twenty-seven rows for the strip.

Nine looped chains will be sufficient, and the worker will find that after a time it is unnecessary to count the stitches in these; the chains can be measured to the length of the first one made.

It does not particularly matter how long they are; but they must be equal, and allow the purse to open wide enough to drop in and take out coins between them. To close the purse after opening it, simply give a tug to the bottom of it.

Peri-lusta or eye-bright can be used instead of mercinette. A ball will make two purses, and it is surprising how quickly two little ones can be made. They are sure to please girl friends.

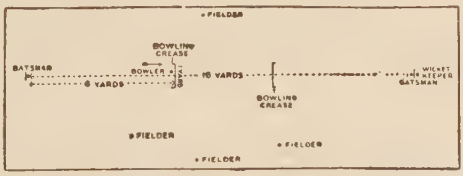
Many people find these purses very useful for carrying gold or silver when travelling.

THE EXCITING GAME OF STOOL-BALL

STOOL-BALL is a delightful game for boys and girls of all ages, and grown-ups enjoy playing it too. It is of old English origin; and many matches are played there each year in September and October. Any good-sized field is suitable for playing in, or it can be played at the seaside on the sands The outfit for stool-ball is most inexpensive, for we can easily make everything but the ball at home, though spliced bats are very much better than home-made ones, and cost very little. A proper stool-ball outfit consists of two bats, measuring not more than 7¼ inches in diameter; a ball, known as Best Tennis No. 3; two wickets, each one consisting of a stake to which a board measuring 12 inches square is mounted. The wickets, when set up, must measure 4 feet 8 inches in height.

Batsman standing ready to take the bowling

Any number of players may take part in the game, which is really a mixture of cricket and rounders, but six or eight players a side are preferred. To begin the game, we set up the wickets 16 yards apart, and mark out two bowling-creases, which must not be over a yard in length, six yards away from each wicket, as we see in the diagram in the centre of this page. This makes the game a very good one for girls, as they have only to bowl 10 yards in order to reach the wicket, instead of 22 yards, as in cricket. Sides having been chosen, we go in to bat two at a time, while the whole of the opposing side goes out to field, except one player who keeps wicket and another player who bowls.



Plan of the field, showing arrangement for stool-ball

The bowling takes place from either bowling-crease in alternate overs of eight balls each, the ball being bowled, not jerked or thrown; and the bowler must stand with one foot at least behind the crease, or the umpire will call, "No ball." The umpire calls out "Over" when every eighth ball has been bowled, a "no ball" not counting in an over. The square board is the wicket, not the stake on which it stands. If, in making a run, the strikers have crossed each other, the player who runs for the wicket which is struck by the ball is out. There are five ways of getting out. If the ball, when bowled, hits the face of the striker's wicket; or if the ball, having been hit, is caught in the hands of one of the opposite side; or if, while running, or preparing or pretending to run, the ball itself is thrown by one of the opposite party so as to hit the face of the wicket; or if any of the opposite party, with ball in hand, touches the face of the wicket before the bat of either of the strikers touch the same; or if, with any part of the person, the striker stops the ball which would, in the opinion of the bowler's umpire, have hit the wicket. Another rule to remember is that no stumping is allowed. When we hit a ball, if we fancy there is time to score a run, we must call "Run" to our fellow-player, and run across to the opposite wicket, each touching the wicket she runs to. The non-striker is held to be "out of her ground" unless her bat actually touches her wicket. Any runs made off a "no ball" which touches neither ourselves nor our bat are scored as "byes." If a striker is run or caught out, the attempted run shall not be scored. The umpire's decision must in all cases be regarded as final, and on all points for which there are no special rules, the laws of cricket hold good for stool-ball also. When we really know the game we shall find it quite as exciting as cricket, and there is no danger of being struck by a hard ball.

Player hitting a catch into the hands of point

Batsman being run out through misjudging a hit

GAMES PLAYED WITH DOMINOES

UNLIKE chess and draughts, which are very ancient games, dominoes are not known to have been played before the eighteenth century, when it was introduced into France and Belgium from Italy, and later came into England. Dominoes are very popular here, but in no other country are they played so much to-day as in France and Belgium.

A set of dominoes usually consists of twenty-eight pieces, each divided into two parts with so many spots or pips on each, although in the north of England sets are often used that contain fifty-five dominoes, going up to the double nine, and on the Continent it is quite common to go up to the double twelve.

THE BLOCK GAME

THE simplest game with dominoes is known as the block game. The dominoes are placed on the table with their faces downwards and shuffled. Then each player draws one, and when these are turned up the player with the fewest spots or pips is the one to start the game. The dominoes are now shuffled again and each player takes seven pieces, which he looks at, but conceals from the other players.

The first player now puts a domino down, say, the six-five, and the next player has to play a piece with a six or a five on it. This he places against the corresponding number and the next player's turn comes. If the second player puts down a six-three, then the third player would play to a five or a three. Thus the play goes on until a player has used all his pieces, when he wins the game. If there comes a deadlock, and no player can match the numbers that are up, then all the outstanding pieces of the players must be turned up, and he wins who has the fewest pips.

THE DRAWING GAME

THIS game is played in exactly the same way as the block game, except that when a player cannot go, instead of passing he must draw from the unused stock of dominoes until he is able to play. Two dominoes, however, must always be left face downwards on the table and not drawn. In both the games described it is always best to play the high pieces, such as double six, six-five, double five, and so on, first, so that if in the end no one can go, we may have as few pips left as possible.

FIVES AND THREES

ANOTHER interesting and exciting game with dominoes is called Fives and Threes. The pieces are shuffled and drawn as before, but the game is not to get out first, but to make as many fives and threes as possible. For instance, the first player puts down the five-four. This makes nine, or three threes. He scores three points. The next player must play to five or four, but he must try to make the outside numbers add up to multiply by three or five. He plays, say, a four-one to the four, and the outside added to five makes six, or two threes. He scores two. The next player plays to five or one. He puts down the five-one not to the five end, but to the one, and the outside five added makes ten, or two fives; score two. Now, suppose the next player has the double five, he puts it down crosswise, and both sections of the domino count—that is, ten is added to five at the other end, making fifteen. But fifteen is not only five threes, it is also three fives, and so fifteen up scores eight points. Only one other combination will give fifteen, and that is three at one end and double six at the other. Double dominoes are always placed crosswise on the line and the pips on both sections are counted. This is one of the best possible games with dominoes. It is always dangerous to start the game with double six, in case the next player may have the six-three and score eight points.

Two, three, or four players can play at this game, and the number of points to be played up—usually 31 or 61—is always decided beforehand by the players.

THE GAME OF MATADOR

IN this game, instead of matching a number, we have to place down a domino so as to make up the number seven. Thus, if the first player has played the five-two, we must play a piece with a two or a five on it, so as to make a seven with one end of the first domino. Suppose the second player puts down a two-six; the end numbers are now six and two, and the next player must put down either a one or a five to make up seven. When a domino is played that makes a blank at the end, this blocks that end, and only a matador domino can be played there.

There are four matador dominoes, the double blank, and the three pieces that have seven pips upon them, namely, the six-one, the five-two, and the four-three. A matador may be played to any number, even if one of its squares does not make up seven with the last piece played, but the piece played to a matador must make seven in the ordinary way.

As a matador may be played to any number, it is wise to keep our matadors in reserve for a difficulty. In playing this game each player takes seven pieces, but when we cannot go we must draw from the reserve, as in the drawing game.

All these games of dominoes may be played by two, three, or four people, and four may play either as individuals or as partners.

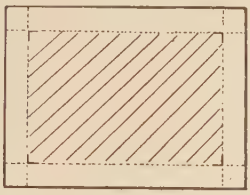
OTHER GAMES

THERE are, of course, variations of these games which are sometimes played. For instance, matador can be played by using five or some other number as matador. If five were taken as matador, then the matador pieces would be five-blank, four-one, three-two, and the double blank; if six were matador, then six-blank, five-one, four-two, and three-three, and double blank would be matador pieces—that is, there would be five instead of four such pieces. Similarly, the game of fives and threes can be adapted to twos and fives or fours and fives, but experience has proved fives and threes to be the best and most interesting combination.

PICTURE-FRAMES FOR THE SCHOOLROOM

We are going to learn how to make frames for little pictures or photographs, so that we can hang them up and become the possessor of a small picture-gallery of our very own.

It often happens that we have a dear little picture on a Christmas card or on a picture postcard, or a snapshot of a friend, that we should like to keep. But we cannot possibly manage a frame out of our pocket-money, and so the poor little picture has to stay on the mantelpiece till its corners are curled up and the front becomes soiled and dirty. Picture 3 on this page shows a little frame just suitable for such a purpose, and quite easy to make.



1. The mount

These are the things we shall need :

1. A few old photographic plates. Everyone who takes photographs gets plenty of these ; they are of no further use for photography, so that people are quite willing to give them away.

2. A penny piece of inch-wide black tape, and a piece of the narrowest width as well, also costing one penny.

3. One dozen small brass rings, costing one penny. We should buy a very small size—just a little larger round than a black lead pencil.

4. Some strong paste. The kind called "photo-mountant" is by far the best, because it is not at all sticky to use and yet fastens things such as paper and cardboard exceedingly tightly.

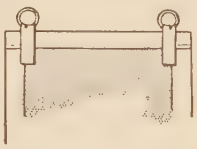
5. Some white paper, a pencil, ruler, ink, and penknife.

Now we can make a start. We must take two old plates of the same size and wash off the film—that is, the jelly-like substance on one side of the glass on which the actual photograph has been taken. If we use *warm* water it will slide off the glass at once, leaving it quite clear and clean. We must polish the glass with a duster, and then, when there is not even the least little smear left, the glasses are ready for use.

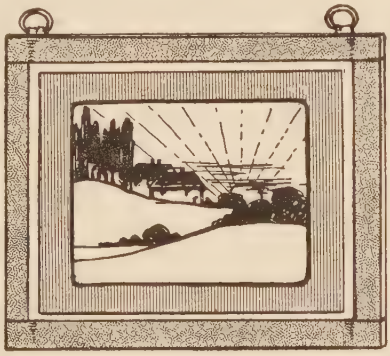
Now we must find our little picture and cut it to fit the size of our plate, or it can be a little smaller. The two pieces of glass are going to form the front and back of our picture ; the picture itself will go in between, and the black tape is going to make the frame to hold it all together. The *mount* makes a border round the picture, and is also useful for filling in the space if the picture should happen to be a very small one.

We must take our little picture and put a small dab of paste on each corner at the back ; lay it on one of the pieces of glass and press it down. Then we put a book on top for a little while to keep it flat.

The next thing to do is to make a mount —that is, the little border which shows in between a picture and its frame. For this we cut a piece of white or cream paper the same size as our glass ; cartridge drawing-paper at one penny a large sheet is the best. This is easily done by laying the glass on the paper, marking round the edges with a pencil, and cutting out along the lines with scissors or a penknife. We place this paper on the table and carefully rule, in faint pencil-lines, a small border all round, about three-quarters of an inch away from the edge. This leaves a square in the middle ; we cut this out very carefully with a penknife and ruler, and we have then got our mount ready to lay over the picture which is stuck to the glass.



2. The rings



3. Picture on brown paper, with white mount

If we look at picture 1, this will be quite clear. We fix the mount to the picture in the same way, by small dabs of paste, and then lay the other glass on top of all. This must be kept in place, too, by paste, but we must be very careful to keep the paste near the edges, so that it will not show when the frame comes on.

The frame is put on next. For this we must cut four pieces of tape, each a little longer than the sides of the glass we are using, cover one side of the tape with paste, and then stick the tape on evenly all round the edge of the two glasses, letting half the width show in front.

We must be quite sure to put the top and bottom on first, and then cut off quite evenly the pieces which are left sticking out. We must put the sides on afterwards, then cut off the extra tape, and smooth down the edges with a little paste, pressed on firmly with the finger.

4. How to arrange the pictures

When the four sides are on, we should put the frame under the book again to press for an hour or so, and then fix on the rings by which it is hung up.

Through each ring we pass a piece of the narrow tape, about two inches long. We then paste the two ends firmly behind the picture, as shown in picture 2, and the frame is complete.

When we have mastered these directions, we shall be able to make more elaborate mounts, because the picture can be improved by the kind of mount we put round it. Brown paper makes nice mounts to photographs, particularly if decorated with a black ink border. Picture 4 shows how the frames may be arranged on the wall.

THINGS TO DO IN AWKWARD SITUATIONS

WITH HINTS FOR BOY SCOUTS

It is essential for any boy who wishes to become successful in life that he should be full of resource, and able to adapt himself to every circumstance in which he is likely to be found. Such resourcefulness is needed not only in boy scouts, but in every boy who does not belong to any organised body of scouts. There are many things that a boy may do when out for a day in the country that will fit him for real scouting and camping work, should the need for such work arise.

TO CARRY WATER

There are various ways of conveying water from one place to another when we have no pails or proper vessels for the purpose. Canvas bags, smeared with grease on the outside, are quite waterproof after they have been soaked for a short time. A basket with oiled cloth arranged inside makes a useful bucket, and if an old cocoanut shell is handy, it may be used for holding water. It is worth remembering that if we are carrying water in pails, some grass picked and placed on the water prevents it splashing. A hole in a leaky vessel may be stopped temporarily with rag or grass well greased over.

TO LIGHT A FIRE

In these days of cheap lucifer matches, there is rarely any need for us to "make fire" when we want to light a fire of wood. But even with matches it sometimes happens that a whole boxful may be wasted on a windy day before the fire can be lighted. It is useful, therefore, to put a greatcoat or cloak over our head and over the piled-up wood before we strike the matches, and then, if we have taken the precaution to gather plenty of dried grass and small twigs, we shall have no difficulty in lighting our fire. Wax matches are much better for outdoor use than wooden ones, as the latter get damp in wet weather if they are exposed to the air for long. If we have nothing dry to rub the match upon, we may ignite it by scratching the head of it with the blade of our penknife.

The right way to make a log fire

FUEL FOR FIRE

It may not always be easy to get wood for fuel, and it is worth knowing that there are various other substances that travellers use for this purpose. Bones of animals are very useful for this purpose, particularly if fresh; but even the bones of cooked meat, if added to a fire, will burn well. The dry manure of cattle, as found upon the ground, is also very useful, and is not at all disagreeable as fuel. If nothing better offers, dried seaweed will burn with great heat, although it does not make a fine, cheerful fire. If large logs are being used for fire, two or three of them should be arranged as shown in the picture, the dark ends being the part in the fire. As they burn away they are pushed forward, and so are burnt according to a regular system.

TO REST IN A GALE

To lie down and rest in the open air when a gale of wind is blowing, we must not make the mistake of getting under a tree, which provides a good roof high up, but has no wall. What we need is a wall, and a wall about eighteen inches in height will be quite high enough.

This may be provided by turning up the turf if we have a spade, or by piling up stones, or perhaps we may find a little hollow with a natural sheltering wall. In a heavy gale there is always a violent eddy in the neighbourhood of a tree, and the result may be seen in a cornfield after a storm, where the corn in the open is unharmed, but that near the tree is all beaten down. It is always warmer to lie down under a cloudy sky than under a clear sky, for the clouds act as a blanket. On sandy plains travellers often keep themselves warm when sleeping at night by burying all but their heads in the sand. The same plan is followed in snowy lands, the snow making a really warm covering and protection from the cold air.

A SIMPLE MATTRESS

When resting or sleeping in the open air, it is as necessary to have something to lie upon as to have proper covering for the body, otherwise the part of the body that is in contact with the earth may get chilled. All kinds of things will provide a useful mattress, and in this matter we may imitate the bird in making its nest. Dried grass, leaves, feathers, heather, wood shavings, bundles of faggots, newspapers, and such like, can be used with advantage, and if the ground is really wet, an excellent bedstead can be made from a heap of stones or a couple of tree-trunks rolled together, if such are available.

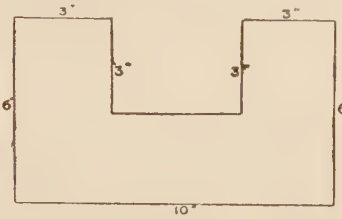
SEATS FOR A MEAL

If we are going to make a stay in one place for any length of time and have no furniture, it is a good plan to dig a trench. This provides both chairs and table, for we can sit on one side of the trench with the feet and legs in the hole, and the other side of the trench makes a handy table. In this way we have a much more comfortable seat than we otherwise should have if we just sat about on the ground or on any odd log that happened to be about.

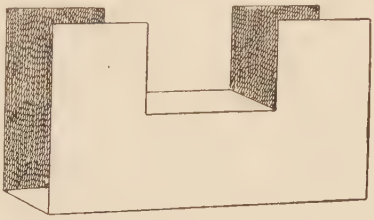
If we are not staying long enough in any place for it to be advisable to dig a trench, we can gather up any dry litter that may be lying about and sit on that.

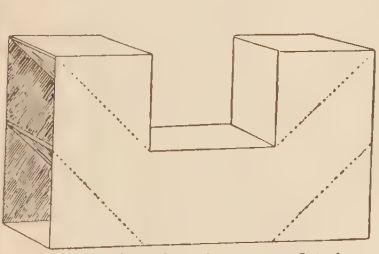
HOW TO SEE THROUGH A BRICK

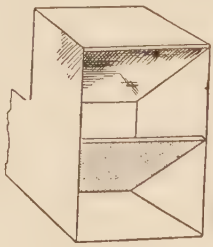
ONE sometimes hears the expression, "I can see as far through a brick wall as anybody else." We shall learn in this article how to make a clever little toy that will enable us to see through a brick, or a book, or a slate, or anything else that is not too large, so that if we hear the expression again, we can tell the speaker that we can teach him how to see quite easily through a brick. We need some pieces of wood—ten in all—about a quarter of an inch thick, and of different sizes. We should see, when we join the pieces of wood together, that all the joins are light-tight—that is to say, that they admit no light. If we do so, the result will be better than it would be if we neglected this point. We cut out two pieces the shape of picture 1, and of the sizes marked in picture 1; then one piece ten inches long and four inches wide, and another piece four inches square. We nail or glue these four pieces together, as seen in picture 2. Now we make and add an upright piece at both ends of the square piece; this will require two pieces of wood four inches long and two and three-quarter inches wide. Then we make two pieces for the top of the box; these will be four inches long and three and a quarter inches wide. When they have been added to the box, it will be as seen in picture 3. Now we must get four pieces of looking-glass all the same size, four inches long and three and a half inches wide. We fit one piece across the inside corner of the box at one end, as seen in picture 4. This must be put in face outwards and at an angle of forty-five degrees with the top of the box—that is to say, the two side edges of the glass will be at equal distances from the corner. Now fit another piece of mirror in the similar corner at the other end of the box. We fit the other two pieces of looking-glass, backs outwards, at the bottom of the box at each end and at an angle of forty-five degrees from the bottom of the box. This is shown in pictures 3 and 4. Now we get two pieces of wood four inches long and three and a quarter inches high, which we put on at each end behind the backs of the lower pieces of mirror. Our toy is now complete, as seen in picture 5; but if we paste coloured paper over it right round outside it will improve its appearance, and also help to make it light-proof at the joints. If we place a brick or a book or anything else of a suitable size on the platform in the middle part of our box, we shall find that, on looking in the opening at one end of the box, we can apparently see right through the brick or book. The effect will be more striking if we have a light—say, a window or a candle—opposite the other aperture. Then the light will seem to shine right through the solid brick or the book when we look into the other aperture. The mystery of how this comes about is made clear in picture 6, which shows what happens inside the wonderful box. If we follow the dotted line from the eye through the box and out at the far aperture, we can understand how we can see through the brick. The mirrors enable us to see not precisely through a brick, but rather round the brick; but the effect is exactly the same as if we saw through the brick. The whole secret is explained by the words multiple reflection, which means that the reflection of the image is thrown from one reflecting surface, or mirror, to another reflecting surface. Good results are attainable only when the mirrors are placed exactly at the proper angles. Therefore care must be given to the angles at which the mirrors are fixed when the toy is being manufactured.

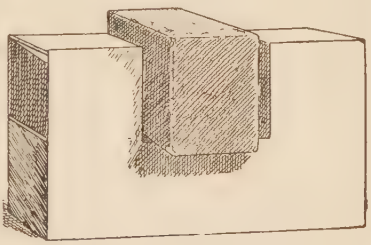


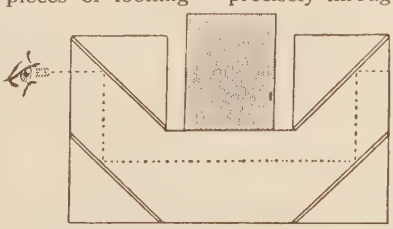
1. Side of the box cut to shape


2. Box with bottom and platform


3. Box after the mirrors are fitted


4. End, showing mirrors

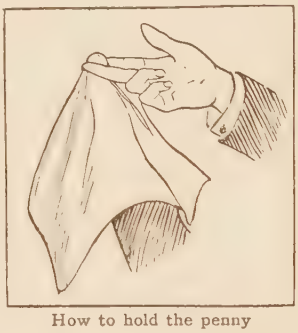

5. Completed box, with brick in place


6. Diagram showing the line of vision

THE COIN AND THE HANDKERCHIEF

THE young wizard will find this a trick after his own heart. It is completely deceptive. It may be exhibited offhand, with any penny, and with any handkerchief. Lastly, it is very easy of execution. Its only drawback is that the necessary movements are a little bit difficult to explain in writing.

The performer begins by borrowing a penny and a handkerchief. A conjurer should always borrow when he can, because anything of his own always lies open to the suspicion, however unfounded, of being in some way specially prepared. Besides, the lenders of the articles used in a trick feel a sort of personal interest in it. In the present case the performer may also ask for the loan of a short piece of string, though there is no objection to his providing this for himself.



How to hold the penny

Taking the penny in his left hand, and holding it upright between the forefinger and thumb, he throws the handkerchief over it, letting the four corners hang gracefully down around it. "Let us settle it comfortably," he remarks. So saying, he nips the coin through the handkerchief, between the first and second fingers of the right hand, held *palm upwards* as shown in the picture, and tilts it over towards the left.

The finger and thumb of the left hand release the coin for a moment, and nip it again by its opposite edge, through the handkerchief. The upright hand is then removed.

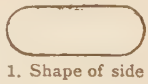
"Now," says the performer, "you would hardly suppose that this simple movement has already caused the coin to vanish. You wouldn't? You are quite right, for here it is still." As if to prove the words that he has just uttered—though nobody in the audience doubts them—he lifts with the right hand the hanging portion of the handkerchief and shows the coin. "Once more we will cover it over." He lets the handkerchief fall around it on all sides. "To make the coin still safer," he says "I will ask somebody to tie this piece of string round the handkerchief." This is done at a distance of about six inches from the coin. "And now," he continues, "I want the assistance of the strongest gentleman in the company." Someone having volunteered, he says: "Now, sir, I want you to take hold of this handkerchief"—he gives him the hanging portion—"and hold it as tightly as you can. Now you and I will have a little tug-of-war, but in a new way. I am going to try whether I can't pull the penny right through the handkerchief. It is not gone yet, you see." He shows the shape of the penny through the handkerchief. "Now then, pull as hard as you like! One, two, three!" He himself makes believe to pull with all his might and finally lets go the handkerchief with a sudden jerk, the penny remaining in his hand.

The secret lies in the fact that by exactly following the instructions given, which, if followed closely, will be found in practice perfectly simple, complicated as they may look in print, the coin is left, after it has been shown for the second time and the handkerchief let fall around it, in an outside fold, whence, under the pretence of pulling, it is an easy matter to work it out into the palm of the hand.

It is hardly necessary to remark that the trick may be worked with a half-dollar, dime, or quarter, just as well as with a cent. Two or three coins may be pulled through the handkerchief at the same time as easily as one when once we have grasped the method.

THE MYSTERIOUS TUMBLING TABLET

THIS is an amusing little toy that is easily made. We cut two pieces of thick cardboard, one and a half or two inches long and half an inch wide. Both of these we cut at each end to the shape of a semi-circle. Now we get a strip of paper—writing-paper will do—one inch wide, and we gum it or glue it round the edges of the two pieces of cardboard, in the position shown in picture 2. That gives us a tiny oblong box, as seen in the picture. But before fixing on the paper as already described, we place inside the box a few round lead bullets or large shot, but not more than will lie across the box in one row. Our "tumbling tablet" is ready to perform. All we have to do now is to place it on any surface with a gentle slope and give it a little start. A tray tilted just a little, or a large book lifted a little higher at one end than the other, will do. Of course, we place the tumbling tablet up at the highest part of the sloping surface. Perhaps it will need a start to go off, and if so we need only roll it over once. Then it will roll over and over down the slope, looking almost as if it were alive. If we are really clever, we can easily understand why it behaves so. The balls or shots roll down the inside of the tablet until they reach the lower end, against which they bump, thereby causing the tablet to turn over. This movement lands the balls at what has become the higher end of the tiny box, and again they roll down to repeat the operation time after time, until they come to a stop because the bottom of the slope is reached.



1. Shape of side

2. Complete tablet

THE NEXT THINGS TO MAKE AND THINGS TO DO BEGIN ON PAGE 4137

THE STORY OF THE BRITISH EMPIRE

WE have finished the history of England, yet the story is as wide as the world. The English live on a little island which seems hardly more than a speck on the map, yet from that little kingdom has grown an empire greater than any other empire that has been. One-fifth of the whole earth and one-fifth of its peoples live under the British flag. If we could walk all over the earth, one out of every five persons we met would belong to the British empire. So vast is this Empire that the sun never sets upon it; it is an empire of eternal sun. We shall read the story of all parts of the empire, but here, in these pages, we get an idea of what the British Empire itself means and how it has come to be. Great Britain has become a great nation because her sons have carried freedom beyond the seas, and it is a fine and solemn thing for them to remember that they are helping to make a nation whose influence reaches to every corner of the earth.

THE EMPIRE OF ETERNAL SUN

CONTINUED FROM 3940

THREE hundred years ago England and Scotland and Ireland were all ruled by a single king; they had been united for the first time under one monarch a few years before. But even then the nation did not own, outside of the British Isles, a single scrap of all the lands that are marked red on the map of the world to-day.

Yet that was 1,100 years after the Saxon Cerdic set up the kingdom of Wessex, and began the line of kings whose blood runs now in the veins of George V. In these three hundred years—quite a small piece of time in the history of the British race—the whole of this great empire has been built up; and another great portion of the earth's surface—the history of which belongs to the same three hundred years—is also in possession of the same race, though it is not part of the empire, as it once was, and as it still might have been, perhaps, but for the blunders of statesmen one hundred and fifty years ago.

How was it that this great expansion, or spreading out, of the peoples of these small islands took place, so that regions so vast have fallen under their dominion in so short a time; that they have taken upon themselves the task of ruling millions upon millions of peoples with black skins and yellow skins, and of making the earth yield up her riches in lands where earlier inhabitants had been content to roam from place to place, plucking the fruits which grew ready to hand, or slaying the wild creatures with bow and arrows?

Well, there had been no chance of expansion till just about a thousand years after Cerdic came to England. It was only then that Christopher Columbus found out for certain that if ships sailed on and on westwards from Europe across the Atlantic they would come at last to land, which in those days men called the New World. And it was only then that the Portuguese sailors found out that if they sailed on and on southwards they could get round the end of Africa, and so sail on to the north-east till they came to India.

As Columbus was in the service of the King and Queen of Spain when he discovered America, the Spaniards claimed that it was a possession of theirs; while the Portuguese mariners made themselves lords of the Indian Ocean; and so those two nations got much store of merchandise and spices from the East, and of gold and silver from the mines in South America.

Now, at first the other European nations tried only to find whether other parts of America, to which the Spaniards had not gone, might not be richer than the islands of the West Indies or than the "Spanish Main" itself, for this was the name by which

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the lands of which the Spaniards had taken possession were called. But presently the English began to think there was no reason why the Spaniards should be allowed to shut everyone else out of those lands, where it seemed almost as if there was nothing to do but pick up gold and silver, or make the natives do it for you; and so they began to fight the Spaniards.

How Walter Raleigh began building up the British Empire

Then there arose, also, men with greater visions than those of just gathering up wealth at ease—men who dreamed of planting colonies, of creating a new England beyond the seas where wealth might be won not without effort, but by energy and skill and endurance.

And though the first attempts which Sir Walter Raleigh made in the reign of Queen Elizabeth came to naught—because men were not content with the slow way of industry when the capture of a Spanish galleon might make a man rich for life at one blow—the plans of Raleigh were at last carried out, when sundry merchants and others banded together to settle a number of Englishmen in a colony which they called Virginia.

Now, the peoples of North America, whom the English called Indians—because at first it had been supposed that it was India itself that Columbus had reached—dwelt for the most part in great tribes, roving from place to place; and they were fierce and merciless in their manner of warfare. And often grounds of quarrel would appear between the Englishmen and the redskins; so that many a time the settlers had to fight for their lives, and many times they gave Indians reason to hate them, and to fear them, too.

The meeting of Englishmen, Frenchmen, and Dutchmen in America

Nevertheless, the settlers prospered, and others came after them; and presently further northward there came new bands of colonists—Puritans, who were ready to leave their own homes in England in order that they might practise their religion after their own fashion, and not as they were ordered by the King of England. And then there came Dutchmen, who took possession between Virginia on the south and these "New England" colonies on the north. But soon afterwards, when there was a war between England and Holland, the Dutch gave up those colonies to England, and the English gave the name of New York to the principal town which had been Dutch. There came Frenchmen, too, who made colonies further north still, in what we call Canada, and further south in Louisiana.

Meanwhile, other merchants had banded themselves together to trade in the East with India and the islands which were called the Spice Islands; one company in London, and another in Holland. For the most part, it was the Dutch who sought trade in the Spice Islands, and the English who sought it in India. And the English got leave from the Emperor of India, who was called the Mogul, to set up what was called a "factory," which meant offices and warehouses to store the goods which they bought from the Indians and the goods which they brought from England to sell; and when Charles II. married a Portuguese wife the Portuguese gave him Bombay, which had come into their possession long before.

How North America was divided into British colonies

In this way the English got trading stations, or factories, at Bombay, and Madras, and Calcutta; and the French got trading stations not far from Madras and Calcutta.

So, a hundred and fifty years ago, the way of things was this. The English had for a long time given up troubling themselves about South America, which they left to the Spanish and Portuguese, as well as Mexico, the southern bit of North America. But in North America, all along the coast from Florida at the south end to Nova Scotia at the north end, the country was divided up into British colonies or states, which had to obey any laws that were made for them by the Parliament of Great Britain, but were allowed in other ways to govern themselves. On the north and on the south were French colonies, but westwards the Indians still owned the land. The French and the British each of them thought they had a right to all that land, taking no count of the Indians; and since they would not share it, but each meant to have it for

themselves, a time came when the two countries went to war. At the end of the war the British had beaten the French so badly that France gave up Canada to England altogether, and all the French colonists in Canada became the subjects of King George III., and they or their descendants have been subjects of the British Crown ever since.

THE QUARREL IN WHICH AMERICA BROKE AWAY FROM THE MOTHERLAND

But after that time numbers of Englishmen and Scots and Irishmen went out to Canada as colonists, as well as many people from the other American colonies. And so to this day the people of Canada are partly British and partly French, but all are loyal members of the British Empire. It so came to pass that, not long after Canada became British, the other colonies in America had such a quarrel with the Mother Country that there was a great war; and at the end of it, owing to the defeat of the British army, those colonies were separated altogether from the empire, and became the United States of America.

Now, while the French and the British were fighting out the question which of the two was to possess North America, they were also fighting out the question which of the two was to possess India—though neither of them at the time really guessed that India itself was going to be conquered.

For India was not at all like North America, where there were no civilised states, but only wild tribes. For India was made up of a number of great states containing many rich and great cities, and having vast armies with cannon like the Europeans, and strong fortresses. The rulers of those states owned the Mogul as emperor, though they paid little enough heed to his will.

FRENCH AND BRITISH GO TO INDIA ON BUSINESS, AND BEGIN FIGHTING

But as for the British and the French, they just had their few "factories" on the coast, with a little bit of ground, and a very few soldiers and guns in case they had to defend themselves from attack; and the rest of their people were the clerks and traders and managers, who were called governors, in the service of the British and French companies.

They had no wish to conquer the native states, and hardly anyone guessed that it would be at all possible even if they did wish it. Only French and British were each of them anxious to get all the best of the trading into their own hands, and to persuade the native rulers to give them advantages over the rival nation.

So when war broke out between England and France, the British and French in the south of India began to fight each other; and then, when some native princes began to fight each other for the thrones of their states, the French and British joined in on opposite sides. The end of it was that the British side won, and the French had to promise to keep no more soldiers in India at all.

But more than that: during the fighting the British themselves and the native princes learnt that a few British soldiers, or native soldiers led by British officers, could defeat huge native armies. And when the prince who was called the Nawab of Bengal attacked the British in their factory at Calcutta, he was completely overthrown; and though a new Nawab was set up in his place, the Mogul very soon afterwards agreed that the British should govern Bengal; while they could rule the country round Madras almost as if it belonged to them.

THE WAY IN WHICH THE BRITISH BEGAN TO RULE IN INDIA

Then, when the native princes saw that a new power had appeared in India, whenever they had quarrels among themselves one or another would ask the British to help them, or to protect them; while some of them thought that if they could only destroy the British they would be able to make themselves lords of their neighbours' lands. And whenever the British had to go to war, either to defend themselves or to protect an ally, the end of it was that some more lands came under the British rule.

So it happened that by degrees half of India passed into the hands of the British, while the various princes of the other half governed their own territories, but had to obey when the British thought fit to interfere. And at last, after the Moguls had disappeared altogether, the Queen of Great Britain and Ireland was proclaimed Empress of India, and all the princes owned her as the supreme ruler.

Now, here is a wonderful thing to think of: that although there are in India ten times as many natives as there are people in the British Islands, and a thousand times as many as the British in India itself, yet they are ruled over by the British people. The British nation has taken upon itself the task of giving justice and order and good government to all those millions of people, whose ways are so utterly unlike their own that the wisest men who go to India, and spend their lives trying to do what is best for the people under their charge, come back at the last saying that they still know hardly anything about them. All that can be done is to strive to do justice among them; for this at least we know, that their lot will be better, and their lives and property safer, while British rule is unshaken, than ever it was in the past, or would be if their rule were ended.

How the British Flag Came to Wave over the Dutch in Africa

But, besides India and Canada, our map shows us that the empire includes a great part of Africa and all Australia, as well as New Zealand and a great number of smaller islands both in the Pacific Ocean and in the West Indies—that is, the islands near the central part of America, in the Atlantic.

Now, in South Africa, the Dutch were before the British; but when the French Emperor Napoleon made Holland really subject to France, then the English, being at war with him, made the Dutch in South Africa submit to them. After the war was over, and Holland was freed from the French dominion, the King of Holland agreed that England should keep South Africa. Still, the Dutch there did not like English rule, and some of them founded two states further inland.

Even quite a short time ago England had a war with those states, the end of which was that they, too, were brought under the British flag; for before that war the English said that they were really subject to the Crown, though it had been agreed they should govern themselves, while they said that they were not subject to the Crown at all. But now everyone, British and Dutch alike, has just the same rights of sharing in the government, and all are free citizens of the empire, just as in Canada there is no difference between the people of French and of British descent.

The Many Kinds of People who Live under the British Flag

In Africa, however, there are a great many more natives—who are either negroes, with black skins, or Hottentots, with brown skins—than there are white people. And these natives have to obey the laws which the white people make, though they are allowed to keep up their own customs unless they are dangerous or do harm in other ways.

Those native tribes which are warlike, and came years ago from other parts of Africa to conquer the quiet tribes, have to be watched very carefully, and this makes the business of government all the more difficult, because people in England are always very anxious not to be harsh or unjust to the natives, and white people in Africa know that they must never let the natives imagine for a moment that they could conquer the whites; so that the people in England and the people out there do not always agree about what is best to be done.

The way in which the British Empire spread in Australia and New Zealand was not the same as in America, or India, or even Africa, for they have never had to fight about these lands.

A hundred years ago there were few Europeans in New Zealand, and in Australia fifty years before that. The natives of New Zealand are a very vigorous people, called Maoris; the colony was started by making a treaty with the Maoris, who agreed to obey English rule. Still, it was a long time before they and the British settlers became friendly; that was brought about mainly because a great English governor, named Sir George Grey, insisted so firmly on seeing fair play between them.

The Spreading of the British Empire into Australia

No one but the British thought of going to New Zealand. But when the British landed in Australia and hoisted the British flag, in 1788, over a hundred years ago, some French ships appeared. Perhaps, if it had been a week later, they might have hoisted the French flag first, and then Australia would have been French instead of British! However, the countries were at peace then, so no one disputed England's possession.

The natives of Australia were not like the Maoris ; they were a feeble kind of savages when the British first went there.

Then they found that this great land was one which was suited for breeding sheep and cattle, and then that there were rich gold-mines ; and more and more people went out and settled on the land and built cities, while the natives went into the great forests. There are no strong peoples among the Australian natives, but only little tribes which can never become dangerous except in the same sort of way as bands of robbers ; they do not make rule difficult, like the natives in Africa ; still less is this land like India, where there are a thousand natives to every European. In that way Australia is more like Canada ; more like a huge England without so many people.

Let us try to think what this mighty empire means—all the people who salute the British flag as their own. A million of people seems a great number, does it not? There are forty-five millions in Great Britain. But in a single one of the countries which it rules — India — there are over 300 millions. And there are more millions in Australia, and more in Canada, and more in Africa, and more scattered all over the world.

THE WONDERFUL LANGUAGES & PEOPLES THAT COME TOGETHER IN THE EMPIRE

There is hardly a language under the sun which is not the native tongue of a number of people who belong to the empire. You could bring together a hundred sons of the empire, not one of whom could understand a word that any of the others spoke. There is hardly a religion which does not include subjects of King George among its followers — Christians, Mohammedans, Buddhists, Hindus, sun and fire worshippers, and worshippers of strange and monstrous beings whom they have imagined for themselves as gods. There are black peoples who a little while ago were cannibals ; long-haired South Sea Islanders and woolly-haired negroes ; yellow skins and red skins ; quite a number of different brown-skinned peoples in India alone, tall Sikhs and little Ghurkas, who love to fight shoulder to shoulder with the Highlanders ; sturdy Bhils and fiery Pathans ; Parsees, who come of the ancient people of Persia ; Brahmins and Rajputs, descendants of the priests and warriors who conquered India five thousand years ago. And side by side with the British race in Canada are the descendants of Frenchmen bearing French names ; and in South Africa, Dutchmen bearing Dutch names. They dwell in the frozen North ; they dwell in the blazing tropics ; amid ice and snow ; under the palm and the deodar ; in the lands of the moose and the walrus ; in the lands of the elephant and the tiger ; in lands where white children cannot grow up, and in kindlier climes where Englishmen can settle and make a home ; in lands like England, and lands as unlike England as can be.

THE MIGHTY TRUST WHICH THEY HOLD FOR THE WORLD OF THE FUTURE

On page 843 of this book is a picture of little Walter Raleigh listening to a sailor telling wonderful stories of the things he had seen on the Spanish Main ; and you could guess from the little boy's face how he was dreaming of the vast England far over the seas which would grow and grow some day long after he was dead. It has grown up now ; the race has spread itself all over the world ; it has not only made itself rich and powerful—which is a small thing after all—but it has made itself the guardian of the welfare of millions and millions of people who had less knowledge, or skill, or courage ; it has taken upon its own shoulders what a poet has called the White Man's Burden. They must answer for it that they have striven for the welfare of these millions honestly, thoughtfully, unselfishly.

THE DREAM OF A LITTLE WALTER RALEIGH OF TO-DAY

If there were a little Walter Raleigh alive to-day, what would his dream be ? Not of new lands to be won by stout hearts and strong hands, but of the duty which is far more glorious, and harder, too—of giving to all those peoples a rule merciful and just, peaceful and free. That is the duty in which the boys and girls of the England of to-day will have to take their share when they grow up. That is what it means to be a citizen of the mightiest empire the world has ever seen—an empire which has done more than any other to teach the world what freedom means, an empire that will no longer live, or deserve to live, if ever its citizens forget its own greatest lesson.

The next story of countries is on 4251.

LITTLE PICTURE-STORIES IN FRENCH

First line: French. Second line: English words. Third line: As we say it in English.

Un matin une petite fille s'assit dans un jardin, jouant avec ses poupées.
One morning a little girl herself sat in a garden, playing with her dolls
One morning a little girl sat in a garden, playing with her dolls.

Tout à coup une fée apparut. "Veux-tu aller dans le pays des fées?"
All at (a) blow a fairy appeared. "Wishest thou to go into the country of the fairies?"
Suddenly a fairy appeared. "Would you like to go to fairyland?"

"Oui!" La fée agita sa baguette, et elles s'envolèrent.
"Yes!" The fairy agitated her wand, and they themselves flew away.
"Yes!" The fairy waved her wand, and they flew away.

"Voici le pays des poupées!" s'écria la petite fille. "Voilà ma poupée perdue!"
"Here is the country of the dolls!" herself cried the little girl. "There is my doll lost!"
"This is doll-land," cried the little girl. "There is my lost dollie!"

"Tu m'as abandonnée à la pluie, mais les fées m'ont soignée."
"Thou me hast abandoned to the rain, but the fairies me have cared for."
"You left me out in the rain, but the fairies took care of me."

"Pauvre Bella! Es-tu heureuse dans le pays des fées?" "Mais oui."
"Poor Bella! Art thou happy in the country of the fairies?" "But yes."
"Poor Bella! Are you happy in fairyland?" "Yes."

"Que fais-tu toute la journée?" "Nous jouons, nous chantons et nous dansons."
"What dost thou all the day?" "We play, we sing and we dance."
"What do you do all day?" "We play and we sing and we dance."

"Qui sont toutes ces autres poupées?" "Des poupées qui ont perdu leurs mères."
"Who are all these other dolls?" "Some dolls who have lost their mothers."
"Who are all these other dolls?" "Dolls who have lost their mothers."

"Puis-je rester ici pour jouer avec toi?" "Demande cela aux fées."
"May I to rest here for to play with thee?" "Demand that to the fairies."
"May I stay here to play with you?" "Ask the fairies."

A ce moment une cloche sonna, et la petite fille se réveilla. C'était un rêve!
At that moment a bell sounded, and the little girl herself awoke. This was a dream!
Just then a bell rang, and the little girl awoke. It was a dream!

THE MOST NORTHERN POSSESSION

To people of warmer climes and more civilised lands, Alaska seems a raw, rough country, a country of rugged mountains and barren snow-covered plains, a country of short summers and bitter winters, a country with little pleasure and abounding peril. In short it is "the wild," — and men sometimes become creatures of the wild, with primitive wants and passions, — savage creatures with savage loves and hates. All around and about they are hemmed in by the relentless mountains, the snow and the cold, with which they have to struggle for their lives, and all for the love of gold.

THE ELDORADO OF THE NORTH

Through the first years of Alaska's history, no one even guessed the riches that lay buried in the heart of this great white land of the North. The story of Alaska begins with the days of Peter the Great of Russia. It was a time of great excitement throughout Europe, for a man by the name of Guillaume de Lisele, First Geographer to the King of France, had just given to the world a new map showing a great undiscovered country between Asia and America. It was reported that this land was one of fabulous wealth, a veritable Eldorado. France and Spain at once sent ships sailing over the seas to discover and claim the new country for their respective sovereigns. Wonderful tales of the northwestern land drifted to the ears of Peter, Czar of Russia, and he too resolved to add it to his empire. He planned two expeditions in charge of Vitus Bering, the Dane. The first failed so completely that Bering returned to Russia convinced that "though there was such a country on the maps, there was none in the sea." But the wise Peter and his councillors would not listen to Bering but persisted in sending him out for another trial. In 1741, Bering once more sailed into the eastern sea. For days at a time he was enveloped in an impenetrable fog, and at last he gave up hope and ordered his ship to turn its head homeward. As he did so, behold! the fog lifted and driftwood and seaweed and birds appeared, and before them lay a great land, and a great peak lifted its giant head into the clouds. And because it was St. Elias' day, they called the peak Mount St. Elias. And thus, Alaska was discovered.

THE PURCHASE OF ALASKA

For the next seventy years or so very little was thought of Russia's new possession. It seemed a bleak, bare land with but few natural resources, and when, in 1867, Russia became somewhat involved in debt, she sold this great tract of snow-bound wilderness to the United States for the sum of $7,200,000. This purchase caused a great deal of excitement and it was the general verdict throughout North America that the government of the United States had done a very foolish thing. It seemed sheer "wasteful extravagance to pay $7,000,000 for 570,000 square miles of icebergs and polar bears."

In 1896, gold was first discovered in Alaska by a man named "Tagish Charlie," when he was fishing one day at the mouth of the Klondike River. People came to their senses with a shock. The "wasteful extravagance" had turned out to be riches, — a land whose mountains and streams were yellow with precious metal. Large numbers of men streamed over the United States to the Pacific coast to take the steamer that sailed to the new land. The country proved even richer than people expected and men went mad with the lust for gold. They searched for it and fought for

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it and killed for it — and many there were who died or who risked their all in the search for the precious dust and found nothing. Others staked their claims and washed out of the hard earth great fortunes in a few weeks' time.

In 1912 the gold output of Alaska was $17,000,000 and today gold is found in almost every corner of Alaska. The individual owners, however, are losing their grasp and the mountains and rivers are being worked by large corporations with ample capital to install expensive machinery. "The day of bucket and windlass has passed for the Klondike. Dredging and hydraulicking have taken their place, and the trains and steamers are loaded with powerful machinery to be operated by vast corporations."

Many Natural Resources

But gold is not Alaska's only source of wealth. In the mountains of the southwest are found rich copper properties; the mining of coal is profitably carried on, and it is prophesied that the southwestern coast of Alaska will be the site of future petroleum refineries to supply the trade of the Pacific Ocean. Next in value to Alaska's wealth of ores is the wealth of her seas. Her salmon fisheries today supply the world's chief canneries. With thousands of miles of seacoast, with hundreds of tributary rivers, Alaska's waters furnish ideal breeding grounds for the red salmon. The first salmon cannery was established in 1877, — today the yearly output of Alaskan canneries is valued at $14,000,000. In another part of our book we have told you something of the seal fisheries of Alaska.

Agriculture, too, has been found to be very profitable in the southeastern portion of Alaska. Potatoes, cabbages, turnips, cauliflowers, beets, etc., grow to an enormous size in the short Alaskan summer. Like mushrooms they seem verily to spring up over night. It is one of the wonderful things of this northland that wild currants, blueberries, raspberries and luscious strawberries can be found growing in sheltered nooks under the very shadows of the glaciers, though some complain that they are too watery.

Establishment of Railroads

"The miner was the first pioneer of Alaska, and the steamboat the next, but the railroads are now vying with them in opening up the country. The White Pass and the Yukon Railroad, one of the most interesting and scenic mountain roads of the world, was the first to cross the coast range, from Skagway, at the head of the Lynn canal, to the headwaters of the Yukon, and has since been extended to a point 140 miles below the famous White Horse Rapids. Seward Peninsula, the great gold district, has three short lines of railroad in operation. They are destined to be parts of the system of railroads which must necessarily gridiron the peninsula and will ultimately become part of the Franco-Russian American (trans-Siberian) project. It will connect with our transcontinental railroad system and make a reality of what but a few years ago was considered a visionary dream — a trip from New York to Paris by rail. The Nome Arctic and the Wild Goose railroads serve some of the cities of Northern Alaska. The Tanana Mines Railroad is opening up the country from Fairbanks and Chena, at the head of the first navigation on the Tanana, to the rich creeks, Pedro, Cleary and others, where gold production is building a new and prosperous camp in the interior, destined to rival the famous Klondike camp of Dawson. The Alaska Central, starting from Seward, is now near the coast and pushing for the Yukon via this new camp of Fairbanks."

The Crafty Huskies

But although the railroads have pushed their way into portions of Alaska, they do not reach one-fifth of the field as yet, and sled dogs, and reindeer, which have been imported from Siberia by the government, are largely used for transportation. A good dog in Alaska is worth anywhere from $50 up. The thick-furred, long-legged "Labrador huskies" are the most

Here is a picture of Sitka, old capital of Alaska. Years ago it was the seat of the Russian governor,—then it was the headquarters of the United States authorities. It is a sleepy, conservative old town, untouched by the bustle and activity that characterize the towns that have sprung up so quickly in the rush for gold.

In Alaska the steamers must sail south before the long winter sets in or the chances are that they will be caught and held fast in the ice-locked waters of the northern seas. Here we see a tourist steamer making its way through the Takou Inlet to the Takou Glacier. It has been surrounded by floating cakes of ice and needs all the force of its powerful engines to push its way through the freezing waters.

powerful as well as the most valuable. "A load of 150 pounds per dog is the usual burden, and seven to nine dogs are attached, each by a separate trace. The Labrador harness is used with them, so the dogs spread out fan-shaped from the sledge and do not interfere with each other. The 'malamutes,' or native Indian dogs, usually half-wolf, are driven and harnessed differently, — all in a line and one before the other. The malamute is the king of all thieves. He will pull the leather boots off your feet while you sleep and eat them for a midnight supper, and he delights to eat up his seal-hide harness. He has learned to open a wooden box and will devour canned food, opening any tin can made, with his sharp fangs, quicker than any steel can-opener. Once a day only they are fed on raw fish, and while the malamute prefers to pilfer, the huskie will go and fish for himself when off duty. Seventy miles a day is the rule with the Indians and their dog teams, and the white man does almost as much."

The dog-driver carries a club and seal-hide whip, both of which he uses unmercifully, for the dogs are very fierce and delight in fighting. A fight among these fierce, half-tamed dogs of the North is not like the fights we see among our own. They fight wolf fashion, strike and leap away, strike and leap away — and the fight is to the death. Each dog knows this law and fights with a horrible intentness. Leap and slash, they fight — until lips and heads and bodies are gashed and bleeding. Around the combatants sits a staring circle of huskies. When either dog shows signs of losing his feet they stand up eagerly; and when at last the defeated dog goes down they close in snarling and yelping, and the dog, screaming with agony, disappears underneath a heaving mass of bodies. There is no mercy shown among the creatures of this wild land.

THE PRIDE OF TRAIL AND TRACE

Yet these dogs, fierce as they are, are faithful to the pride of trail and trace. Once in the harness, the dogs are utterly transformed from savage half-wolfish creatures into alert, active workers. The toil of the traces seems the supreme expression of their being. Men wise in the ways of the wild will tell you that sick dogs have been known to die of a broken heart when cut out of the traces.

In "The Call of the Wild," Jack London tells the tale of such a dog:

"It was Dave who suffered most of all. Something had gone wrong with him. He became more morose and irritable and when camp was pitched at once made his cot where the driver fed him. Once out of the harness and down, he did not get on his feet again till harness-up time in the morning. Sometimes, in the traces, when jerked by a sudden stoppage of the sled, or by straining to start it, he would cry out with pain. By the time Cassiar Bar was reached, he was so weak that he was falling repeatedly in the traces. The Scotch half-breed called a halt and took him out of the team, making the next dog, Sol-leks, fast to the sled. His intention was to rest Dave, letting him run free behind the sled. Sick as he was, Dave resented being taken out, grunting and growling while the traces were unfastened, and whimpering broken-heartedly when he saw Sol-leks in the position he had held and served so long. For the pride of trace and trail was his, and, sick unto death, he could not bear that another dog should do his work.

"When the sled started, he floundered in the soft snow alongside the beaten trail, attacking Sol-leks with his teeth, rushing against him and trying to thrust him off into the soft snow on the other side, striving to leap inside his traces and get between him and the sled, and all the while whining and yelping and crying with grief and pain. The half-breed tried to drive him away with the whip; but he paid no heed to the stinging lash, and the man had not the heart to strike harder. Dave refused to run quietly on the trail behind the sled, where the going was easy, but continued to flounder alongside in the soft snow, where the going was most difficult, till exhausted. Then he fell, and lay where he fell, howling lugu-

briously as the long train of sleds churned by."

"With the last remnant of his strength he managed to stagger along behind till the train made another stop, when he floundered past the sleds to his own place, where he stood alongside Sol-leks. His driver lingered a moment to get a light for his pipe from the man behind. Then he returned and started his dogs. They swung out on the trail with remarkable lack of exertion, turned their heads uneasily, and stopped in surprise. The driver was surprised too; the sled had not moved. He called his comrades to witness the sight. Dave had bitten through both of Sol-lek's traces, and was standing directly in front of the sled in his proper place.

"He pleaded with his eyes to remain there. The driver was perplexed. His comrades talked of how a dog could break its heart through being denied the work that killed it. Also, they held it a mercy, since Dave was to die anyway, that he should die in the traces, heart-easy and content. So he was harnessed in again, and proudly he pulled as of old, though more than once he cried out involuntarily from the bite of his inward hurt. Several times he fell down and was dragged in the traces, and once the sled ran upon him so that he limped thereafter in one of his hind legs.

ON THE TRAIL.

"But he held out till camp was reached, when his driver made a place for him by the fire. Morning found him too weak to travel. At harness-up time he tried to crawl to his driver. By convulsive efforts he got on his feet, staggered, and fell. Then he wormed his way forward slowly toward where the harnesses were being put on his

mates. He would advance his fore legs and drag up his body with a sort of hitching movement, when he would advance fore legs and hitch ahead again for a few more inches. His strength left him, and the last his mates saw of him he lay gasping in the snow and yearning toward them. But they could hear him mournfully howling."

Winter is the working time for the dogs, but the brief warm summer, — when everything is abloom and mosquitoes swarm over mountains and flats — is one long playtime.

DIGGING FOR GOLD.

Dangers of the Trail

"Mushing" on snow-shoes with dog teams over the mountain passes is sometimes dangerous work. "Men go lightly clad, discarding furs and ordinarily wearing only thick clothes. Motion becomes a necessity and to tarry means to freeze. The danger of the traveller going by himself is that the frost may affect his eyesight, freezing the eyelids together, perhaps dazing his sight, unless snow-glasses are worn. Ice forms in the nostrils so rapidly, as well as about the mouth, and upon the moustache and beard, that it is a constant effort to keep the face free from accumulating ice. In small parties, however, men travel long distances, watching each other as well as themselves, to insure escape from the ravages of the frost. When the journey is long and the trail has become severe, the Arctic drowsiness is another of the enemies which must be fought."

During the Arctic winter, night prevails for twenty-two or twenty-three hours out of the twenty-four; yet so brilliant are the skies from the light of the aurora borealis and the Arctic stars that men work and travel just as usual.

The frozen rivers are used in winter as the principal highways. A curious thing about these northern waters is that the ice forms from the bottom and "rising fills the water with floating masses and ice particles, which then become congealed almost immediately. You may be frozen in before you reach the shore in ice yet too thin to walk upon or permit escape. The Yukon freezes up about the 10th of October, the snow shortly follows, and there is no melting of the ice until early June. The seasons of this land are said to be 'Winter and June, July and August."

On the left, a kettle of liquid air stood on ice appears like a kettle of boiling water. The ice, being much warmer than the intensely cold air, changes it into gas like the ordinary atmosphere. In the second picture, liquid air in a cup is plunged into a bottle of water, and escapes with a loud, hissing sound like steam.

HOT THINGS AND COLD THINGS

CONTINUED FROM 3948

WE know that matter may exist in a solid, liquid, or gaseous state, and we know, too, that, as a general rule, what we call heat makes a great difference in this respect. We take water and we make it cold, and if we go on making it cold long enough, it becomes solid. If we begin with this solid water, or ice, and add heat to it, it becomes liquid. We might say, then, that liquid water is ice plus heat—that is to say, ice with heat added. *Plus* means add. If now we add more heat to this liquid water, or, in short, if we boil it, it all disappears, and we know that it has gone into the air as water-vapour, or gaseous water.

So we can go farther and say that water-vapour is liquid water plus heat, just as liquid water is ice plus heat. If that sounds reasonable, we are already on the way to understanding what heat is, and as it is heat that we now have to study, we cannot do better than get this notion of heat as something added to matter, something that, as a rule, makes the difference between the different states of matter.

Now, the all-important question about which men have argued for ages is the question as to what this something is. We are fortunate enough, nowadays, to be able to come in at the end of the argument and get the result without the trouble of working it out. There is in heat a something that is undoubtedly real. We know there is nothing unreal about the heat of a red-hot poker. But is it a kind of matter? Is it a thing that could be weighed? Or, if not, what is it?

In the first place, it is possible to make certain that heat is not a thing which can be weighed. A hot thing, as we read upon page 3762, is no heavier than it was when it was cold. But every kind of matter has weight, because gravity acts on every kind of matter. Therefore, heat is not a kind of matter. But it is certainly something, and a very real something, and so we want to know what it is.

At one time men got out of the difficulty by inventing names. One of the greatest Englishmen of our time, George Meredith, said that "naming saves a lot of thinking"; and this is a case in point. Men said that they would call stones and water and gases, and so on, the things that could be weighed, or, to use the long Latin word, the *ponderabilia;* then, they said, we will call the other things, such as heat, that cannot

be weighed, but which are certainly very real, *imponderabilia*. But, of course, these long words really tell us nothing. We are not a bit farther on when we have invented them than we were before, though in all times and places, and on every kind of subject, men are apt to think that naming carries them along the road of progress.

In our own day we have learnt what this thing really is that cannot be weighed. It is motion. Motion cannot be weighed; it cannot be handled or tasted, but it is very real, as we know. We know, too, that there are many kinds of motion, and, of course, it does not do to say that heat is motion unless we add that it is a very special and particular kind of motion, quite distinct from any other. We believe that heat is a special to-and-fro motion, which we have learnt to call a vibration, of the atoms or molecules of which matter is made. Now, this idea, simple enough in itself, has very startling consequences.

THE SWINGING OF THE MOLECULES THAT MAKES WATER HOT

Let us consider a simple case like that of water. Let us imagine that we have a little liquid water before us; it may be cold or hot water, but, in any case, it has a certain amount of heat in it; in other words, its molecules are vibrating at a certain rate and, as we may suppose, with a certain length of swing to each vibration. Now, if we add heat to this water, we are adding to it—on our notion of what heat really is—more motion of this particular kind. Well, when the molecules of the water get this extra motion added to them—perhaps taking the form of a quicker motion, or perhaps taking the form of a longer swing, or perhaps both—the time comes when it is simply impossible for the molecules to swing so freely or so quickly, and yet to hold together in the way that makes liquid water. With so much heat in it, the water has to become gas, other things being equal, and it does so. It boils. This water-vapour, as it now is, may have still more heat added to it, nor can we say what limits there are in this direction.

But now let us travel in the other direction. Instead of adding heat, which is a special kind of motion, to the water, let us begin to take from it the heat that it already has. We know that, when we cool the water, in course of time it turns solid. Other things being equal—and we have to say this because the question of the pressure of the atmosphere really comes into this too—the molecules of the water can no longer be related in the way that makes the water liquid, if we take away from them too much of that particular kind of motion which we call heat. Deprived of much of this motion, the molecules have to arrange themselves in a different way, so that we have what we call ice.

ICE THAT CAN BE COOLED AND ICE THAT CAN BE HEATED

Now, though we all agree that liquid water may be hotter or colder, because we notice this every day, perhaps we are not all quite sure that ice may be hotter or colder; yet it certainly may. We can cool the ice as we cooled the water, and all the time we are taking away from it this particular kind of motion called heat; and so we may go on and on up to a certain point.

Now, if a man has a certain amount of money, it may be added to, and there is no particular point at which no more can be added, and so it is with the addition of heat to anything. But if we start taking away a man's money, say, at the rate of one penny after another, the time is bound to come—and bound to come whether he started with a penny or with a million dollars—when he has no more money to lose, and, whatever we do to him, we cannot make him lose any more.

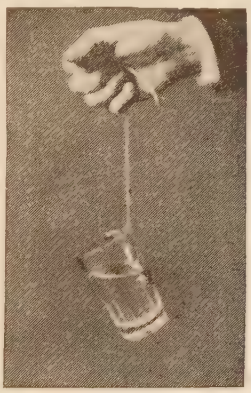
Now, what is true of money must be true of anything else, such as the kind of motion we call heat. As we cool the ice, we are taking this motion away from it, but the amount of it that the ice has is not infinite, and in course of time, if we go on steadily—though this may be tremendously difficult or impossible—we shall take away all the heat that was in the ice, and we shall have something which is absolutely cold.

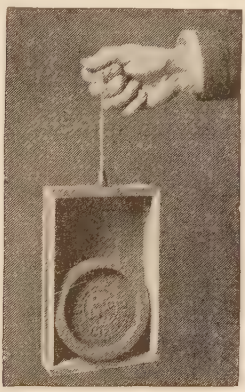
HOW ICE CAN BE MADE SO COLD THAT IT CAN BECOME NO COLDER

There is now no heat in the ice; the utmost part of the kind of motion we call heat has left it. So far as that kind of motion is concerned, its molecules and atoms are still; they cannot be colder. If heat is such as we suppose, this must be a possibility for matter of all kinds, whether ice or anything else.

Further, it is possible to find out how cold a thing would have to be so that it could be no colder, and we do indeed know what that point is compared with our ordinary scales of temperature, about which we have already learnt something. In various ways it has been shown that 273 degrees below the zero on the centigrade scale is absolute cold. Matter reduced to that point would have no heat in it. Nothing can be colder than this. This discovery is one of the greatest that has ever been made in this part of science, and it has many interesting consequences, as we shall see.

First, let us consider the matter of measurement, always so important. We now have something better to go by even than the freezing-point and the boiling-point of water; we have something even better than the freezing-point of mercury or, indeed, of any substance that we know. We have discovered the existence of a point at which what we call heat has ceased to exist.





A leaden bullet tied to a string is dipped in liquid air, which makes it so cold that when the bullet is placed in water it freezes the water, and a tumbler can be suspended by the bullet, which freezes to the side of the glass, as in the first picture. On the right, a box containing a weight has a recess at the top filled with mercury. The cold bullet placed on the mercury freezes it, and the box is suspended like the glass.

Plainly, that point must be nothing, or zero, on the best possible scale of temperature. So, while there is a zero on the centigrade scale, and on various other scales, we now have discovered the *real zero*, where heat and temperature really begin; and this we call the *absolute zero*. All over the world, men of science are rapidly learning to think and write in terms of this real scale of temperature.

Any student of heat, going to lectures or reading text-books, will find such phrases as "10 degrees absolute." The ordinary clumsy way of expressing that point on the scale would be "minus 263 degrees centigrade," and, of course, we can see at once what a great advantage it is to reckon on the new scale. It is a great find for science to have discovered Nature's zero of temperature instead of having to fix on some point far above that real zero, and then to call that point the zero because we know no better.

The next question which must occur to everyone who thinks about this is: What is matter like at absolute zero? Let us imagine what this means. We have taken a gas, such as water-vapour or hydrogen, the molecules of which are moving about in a particular way, which we call heat. We have steadily taken away that motion; the gas has steadily become colder, first liquid and then solid. When we have taken away all the motion of this kind, what will be left? We must remember that the substance we are dealing with has steadily shrunk all the time; indeed, not merely part of its size, but by far the greater part of its size to begin with, was due to the heat in it. If now, as we cool it, its size begins to lessen, is it not quite possible that when we have made it absolutely cold there may be nothing left of it? This was at one time believed in, and we can see that it is not unreasonable. But now we believe that, even at absolute zero, matter would not disappear; in other words, heat is something added to matter, but heat is not matter. So, when all the heat has been taken away, there is still matter left, though it is not at all in the same state as with the heat added.

In the last paragraph it was said "we believe," and that has to be said because the correct answer to the next question, "Has matter ever been reduced to the absolute zero?" is No. So that we cannot yet say for certain. However, we have a great deal of evidence which makes us entitled to say that matter would not disappear at the absolute zero, even though we have never succeeded in reaching that point yet, and possibly never shall reach it.

In the first place, it is believed by astronomers that in the mighty tracts of space between the stars and planets there are quantities, by no means small, of matter, such as is often called *cosmic dust.* Now, students of heat are convinced that in these great spaces the temperature must be practically that of the absolute zero, the coldest possible cold. Therefore, the existence of this temperature does not mean that matter disappears.

In the second place, we have the evidence provided by our own little attempts on the earth to reach the absolute zero. Let us now see how far down the scale man has been able to go, and what results he obtains.

It is by no means a difficult thing to make carbonic acid gas solid, and then it looks like a sort of very cold snow. After all, snow itself is only solid water-vapour, and the two cases are quite parallel. It is very much more difficult, but still it is possible, to take the mixture of gases which we call air, and first of all to make it liquid by cooling it very much, and then by cooling that liquid still more to make it become quite solid.

THE GREAT MARVEL OF LIQUID AIR THAT CAN BE POURED OUT LIKE WATER

Perhaps the greatest work of this kind has been done by Sir James Dewar, at the Royal Institution in London. Liquid air is vastly colder than ice, and it looks like water. It can be stored quite easily in vessels, and poured about just like water. A few drops running over our fingers would do them no harm, but, of course, we should not put our fingers in it, and the consequences of drinking it, which has been suggested, are too terrible to think about.

The use of liquid air is one of the most convenient ways for making low temperatures—that is to say, for making other things cold—and it is now very largely used in chemistry for this purpose. There has also been recently made a device whereby a rescuer going down into a coal-mine, in order to try to save the victims of an explosion, could carry liquid air down with him, and then, as it evaporated, he would have it to breathe. The suggestion has also been made, by the present writer, and doubtless by other students of the subject, that liquid air might be used, when it is much cheaper than it is, as a means of ventilation. It would make rather a cold kind of ventilation, but probably nothing could be better if it were cheap enough. Of course, liquid air is always very much colder than anything round about it. This means that the kind of motion called heat is pouring into it from outside, and, as this happens, the liquid air evaporates, and turns into ordinary gaseous air again.

A PIECE OF SOLID AIR THAT CAN BE SEEN

No one could tell by looking at it that liquid air was not water, and when it is frozen no one could tell it from ice by looking at it. Solid air is, of course, very much colder than liquid air, but it is very far from reaching the lowest temperatures.

By the use of liquid air, and with the aid of very strong and expensive machinery, it is possible to liquefy all the gases that are known. It was a great triumph when the lightest of all the gases—hydrogen—was liquefied; and from liquid hydrogen there can be obtained for a few seconds solid hydrogen. Latterly, success has been obtained even with the gas helium, which had resisted all previous attempts; and this also has been liquefied.

Now, the question is: How low down in the scale do we get with such gases as these? The answer is that in the last few years steady progress has been made, and, instead of having to be content with, say, 14 degrees or 12 degrees absolute, we have got down to as low as 5, 4, and perhaps for a moment or so even just below 3 degrees absolute. Of course, when we say 3 degrees absolute, we mean 270 degrees below the freezing-point of water on the centigrade scale. Now, at first it sounds as if the great goal which all chemists desire will soon be attained: if we have got to within 2 or 3 degrees of the absolute zero, we can surely conquer the short distance that still remains; but of this we are not so certain.

THE TREMENDOUS DIFFICULTY OF GETTING ALL THE HEAT OUT OF A THING

In the first place, though 2 degrees or 3 degrees is not much in our ordinary way of thinking, yet that partly depends upon the way in which our minds are deceived by figures. If we chose a much finer reckoning, and

divided every degree into a thousand degrees, then the interval between solid helium or hydrogen and the absolute zero would sound much larger.

Then, again, it is the fact, and one which applies in many instances in science, that the farther we go the slower we go. We might suppose that to travel from 12 degrees absolute to 8 degrees would be just the same as to travel from 8 to 4 or from 4 to zero; but that is very far from being the case. Every degree lower is much harder to conquer than the one before.

Two illustrations will help us to understand this, though at first sight they seem absurd. There is first the excellent illustration, which we should all know, of the man who owed another man 32 cents and paid him first 16 cents, then 8 cents, then 4 cents, and so on, each time halving what he paid. Now, in a very short time the man to whom the 32 cents was owed got 31 cents; but not in the course of all eternity would he get the whole of the last cent, even though he got an instalment on these terms every second. Look at it from the point of view of the man who is trying to get the whole 32 cents, and we see that, as each time he is only getting half of what remains, however long he goes on there must always be left behind as much as he got last time.

Flowers placed in liquid air become frozen in a few moments, and are as brittle as glass.

Now, suppose that, instead of trying to get 32 cents out of a man, we are trying to get all the air out of an air-pump, and suppose that, just as the creditor got 16 cents when 32 cents was owing to him, and 8 cents when 16 cents was owing to him, so in this case every time we work the pump we withdraw half of the air remaining in the space we are trying to empty. We shall soon make it very empty indeed; but if we go on for ever on those terms we shall never empty it, because, however little remains before each stroke of the pump, we only get half of that out, and so it would go on always.

These illustrations help us to understand that it is more easy to conquer a hundred degrees downwards from the freezing-point of water than it is to conquer the last degree or two in the attempt to reach the coldest cold; and, indeed, it is probable that we shall never completely succeed. But a great deal has already been done, and it is extremely valuable indeed to go no lower than the temperature of liquid air, as the attainment of that has put into the hands of the modern chemist an instrument of the highest usefulness.

One of the most interesting and important discoveries which we make when we study low temperatures is that the ordinary processes of chemistry are greatly changed. It seems, indeed, that by far the greater number of ordinary chemical processes, such as happen when a fire is burning, or such as those which are always going on in our own bodies, can only occur within a certain range of temperature. It is believed, for instance, that at the temperature of the sun things are too hot for any chemical processes to occur—that an atom of one kind cannot there combine with an atom of another, and, in consequence, there are only elements in the sun and no chemical compounds.

When we descend instead of ascending, the same result is, in general, true. Just as chemical processes cease at high temperatures, so most of them cease at very low temperatures. Elements which ordinarily combine with each other with great force, and perhaps explosive violence, do nothing at all with each other when put together at very low temperatures. Nevertheless, as Sir James Dewar and the great French chemist Moissan have shown, there is also a low-temperature chemistry

about which we know practically nothing as yet, because hitherto no one has been able to study it, and we did not know that such temperatures existed. This low-temperature chemistry has its own peculiarities and limitations, and when this new world of chemistry has been explored, it is certain to yield results of the greatest importance to knowledge generally.

THE GREAT HEAT THAT DESTROYS EVERY LIVING THING

It is of the greatest importance to study the relations of the extremes of temperature to life. Every living thing that we know has a certain range of temperature in which it lives best. Now, we may take a living thing, and we may study the effects of heat on the one hand, or cold on the other. The first general rule we discover is that heat is very fatal.

No living thing we know can survive the temperature of boiling water for any length of time. Certain microbes, if they happen to have covered themselves up with a thick coat for the time, may stand the temperature of boiling water for a minute or two, but that is all. Now, though boiling water is hot, its temperature is nothing at all compared with that of an ordinary flame, much less that of a furnace or the sun. We see, therefore, that the upward range of life in regard to temperature is very short indeed. Of the thousands of degrees upwards that can easily be attained, only a few tens have to be passed before life is destroyed.

The contrast when we go in the other direction is extraordinary. It has long been known that fish, microbes, and plants of various kinds will stand a great degree of exposure to ice without being killed.

MICROBES THAT STOP LIVING AND BEGIN TO LIVE AGAIN

But probably no one would have guessed the fact, which was proved at the Royal Institution a few years ago, that microbes which could not live for five minutes at the temperature of boiling water can be kept in liquid air for as long as six weeks on end, if not longer, and yet be found alive. This very remarkable discovery can now be explained almost with certainty. We are not to suppose that the microbes live at their ordinary rate and in their ordinary way while they are being subjected to this terrible cold. They seem, as it were, to stop living for the time, but they do not die. That upon which their life depends is not destroyed, and therefore when they are taken out of the liquid air they can start living again, so to speak; though while they were in it the cold was far too great to allow those chemical changes upon which life depends to go on.

We are learning that life depends upon *ferments* — very complicated chemical compounds which have the extraordinary power of starting and keeping up chemical processes in the things around them. Every known ferment is very easily destroyed by heat.

If we take a little pepsin, the stomach ferment, or any other, and boil it for a minute or two, it will never do any digestive work again. Here we see the reason why living things are so quickly destroyed by heat. They are killed because the ferments, without which they cannot live, are simply broken up by the heat, and when they are cooled down again there is no recovery, for these ferments are gone; and without ferments new ferments cannot be made. That is the great wonder of them.

WHY IT IS BAD FOR BOYS AND GIRLS TO EAT TOO MANY ICE CREAM SODAS

But take the case of the low temperature, and apply what we have already learnt to it. The microbes that we take and bury in liquid air depend for their life—as do all living things—upon the ferments they contain. When heated, those same microbes would be killed because the ferments were destroyed. But cooling does not destroy a ferment; it merely stops the action of the ferment; digestion cannot go on in the cold. That is why it is bad for little boys and girls to eat too many ice cream sodas.

Therefore, as life depends upon the action of ferments, and as ferments cannot act in the cold, we cannot say that the microbes in liquid air are actually living, or, if they are living, they are, at any rate, "not doing anything at it." Yet, as we find afterwards, they are not killed, and the reason is that, though their living has been stopped for the time, the things upon which life depends have not been destroyed.

The next part of this is on page 4179.

THE FRENCH REVOLUTIONISTS

CONTINUED FROM 3990

ABOUT 130 years ago there were very great troubles in the kingdom of France, and violent changes took place. The French monarchy was turned into a republic, so that there was no longer a king at the head of affairs, because it was said that every country ought to be ruled according to the will of the whole people who live in it, and not according to the wishes of one man or of the few who have wealth and power. After all, it was not very long before the French found themselves again being ruled by the will of one man, who became the Emperor Napoleon Bonaparte, of whom we read in other parts of this book.

But the changes which took place before that make up the story of what is called the French Revolution. And some of these changes in the government of the country and the life of the people have continued to the present time in France itself, and some have been adopted since that time into other countries of Europe.

Now we are going to learn something about the men and women who made this French Revolution, or tried to prevent it; but we shall not be able to understand much about them unless we first of all try to imagine the state of things which made people so determined to have a change that they allowed all sorts of wicked and terrible things to be done rather than stay as they were. In England there was a free government—that is, the people ruled through the Parliament, and the king and the ministers had to obey the law like everyone else. But in France the king and his ministers could do very nearly as they liked, so long as they did not interfere with the privileges of the clergy or the nobles.

But the common people suffered grievously by reason of these very privileges; for in the country places the peasants were almost the slaves of the great landowners, who were called the seigneurs. And in nearly all the land, except in Brittany and the district called La Vendée, the seigneurs cared nothing for the needs or the sufferings of the peasants; and although the seigneurs and the clergy had to pay no taxes, the peasants were compelled to pay heavy taxes to the State and feudal dues to the seigneurs, which meant sometimes money and sometimes the produce of their lands. Besides all this, they had to labour for the seigneurs without pay—all of which was very unlike anything that had been known in Great Britain for more than 400 years. There were

many people who for a long time past had been saying that all this was very wrong, and had been pointing out that people in England were much more happy and prosperous, and among these we may try to remember the names of Voltaire and Diderot. But these two men did not arouse so much excitement as Jean Jacques Rousseau, who came from Switzerland; for he had been brought up in poverty, and had led a strange, wandering, discontented sort of life, failing in everything at which he tried his hand, until he took to expressing his ideas in books, which at once made him famous.

The idea he had got hold of was that civilisation was all wrong, and that people would be much happier living in what he called a natural state, with very little law or government at all. He said that people who were strong and rich had persuaded the rest to serve them by pretending that they would protect them, and so had got the rulership into their own hands, and used it for their own advantage. In this way the poorer classes were robbed of their natural rights.

ROUSSEAU, WHO TAUGHT THAT THE WILL OF THE PEOPLE SHOULD TRIUMPH

He maintained that everybody ought to make a new agreement or social contract, according to which everything should be settled by the will of the people; and that there should be no more kings or seigneurs or people who had privileges, but everything should be arranged in the way that the mass of the people thought best for themselves. This teaching of his about the rights of man and the social contract became very popular.

All the seigneurs belonged to a group of great families who kept themselves very much aloof from ordinary folk, and they are spoken of sometimes as the *noblesse*, and sometimes as the aristocrats. There were a few of the aristocrats who were very much in favour of some of the new ideas that Diderot or Voltaire or Rousseau were talking about. The king had not nearly enough money to carry on the government, especially as there had been great expense, owing to a war with England, and he was advised that the only thing to be done was to summon an Assembly of the Three Estates —as the Noblesse, the Clergy, and the Commons were called — to consult them as to whether better arrangements could be made for governing the country. At this time there were two men who became very notable as leaders of the people, both of whom belonged to aristocratic families—one was Mirabeau, and the other was Lafayette.

THE TWO MEN WHO MIGHT HAVE SAVED FRANCE FROM THE GREAT TERROR

It was a very unfortunate thing that these two could not be friends, for what both of them wanted was to set up in France a government in which the voice of the people should be heard, and yet let the king and his ministers have a good deal of power—more, really, than the King of England had. Both of them had learnt a good deal in England or in America; for Lafayette had come to America when he was only twenty, and had served under the great George Washington in the war which ended in the separation of the United States from England; so he had seen what Americans and Englishmen meant by freedom, and also how wise and great a man Washington was.

Mirabeau had lived for some time in England, and had seen there how it was possible for justice and law to rule everywhere without any oppression, and for both king and people to have a share in the government. But the least that either of them wanted would have made so great a change in France that the court and most of the aristocrats and the clergy would have nothing to say to them. And perhaps the saddest thing is that if King Louis had been a wiser man, those three working together might have made the French Revolution a peaceful affair, which would have set up in France a government not very unlike that of England.

THE GOOD KING LOUIS, WHO TRUSTED BAD COUNSELLORS

Louis himself was a good man, who wished to do what was right and just. He was a brave man, too. But he was not clever himself, and he was not like some other kings who have had the wit to choose good advisers and trust them. Instead of that, he trusted people who gave him bad advice, and could see nothing but harm in the changes that Mirabeau and Lafayette demanded when the Three Estates were assembled in what was called the States-General and afterwards the National

THE BIRTH OF THE FRENCH REVOLUTION

At the outset of the French Revolution, the representatives of the Commons formed themselves into an Assembly with power to make laws. But the king forbade the sittings, and the hall of meeting was closed and guarded by soldiers. Thereupon the Assembly proceeded to a tennis-court, and, led by their president, Bailly, as shown in this picture, took a solemn oath not to separate till they had given France a constitution.

Even after the Constituent Assembly, as the Parliament was called, was recognized by the king, he and the nobles plotted against the popular cause. At last the people took up arms, and some of the king's troops joined them. On July 14, 1789, a day ever to be remembered in French history, they captured the Bastille, the grim fortress of Paris, and levelled it with the ground. This marks the passing of the old order of things in France.

Assembly. It seemed to them that to take away the privileges of the noblesse and of the clergy would be robbery, and that the proper thing for the common people was not to govern but to obey their betters, among whom was Queen Marie Antoinette.

Mirabeau understood what was needed better than any other man in France. He was a man who lived a wild life privately, and was always greatly in debt, which set a good many people very much against him; and he was domineering, so that it was not easy to be friendly with him. But he was a wonderful orator; so that when the Assembly had come together bent on doing one thing, he could sometimes persuade it to agree to something altogether different. He would rouse people up to be enthusiastic when they were timid and hesitating; and in this way he had a great deal of power, though people were really afraid to trust him.

He was called the Tribune of the People, because he was so bold in demanding what he considered the people ought to have, and because he wanted the "privileged orders" to have their privileges taken away and to pay their share of the taxes.

How Mirabeau tried to bring the king and the people together

But he saw, too, that many who had come to the Assembly had no idea as to what good government meant. The Assembly was not fit to be the real ruler; he wanted it to have power, but he knew that the only way to prevent terrible things happening was for him to become the real ruler himself. He wanted the people to trust him, and he wanted the king to trust him; but presently it came about that, while the king suspected him of being on the side of the people and against the crown, the people, and those who had most influence with them, suspected him of being really on the side of the crown against the people, when the thing he was striving to do was to unite crown and people for the good of both.

Several of the changes which Mirabeau wanted were made, but there was really no chance of bringing the king and the people into agreement after he died, which happened before the troubles had been going on for a very long time; for he tried to do such an immense amount of work that he wore himself out, and as soon as he fell ill, death overtook him very quickly.

Lafayette was a very different kind of person. He was a very popular and high-minded gentleman, who had won great praise as a soldier when he was fighting in America under George Washington. After the States-General had come together, and had been turned into the National Assembly, it began to be very difficult to keep order, because everyone was in a state of excitement.

Lafayette, who tried to keep order in Paris and displeased all parties

So the better class of the citizens in Paris were enrolled, as soldiers in what was called the National Guard, to keep order; and Lafayette was made their general. He was very popular among them, and some people began to think that Lafayette meant to make himself the real master by the help of his soldiers, like Julius Cæsar in Rome or Oliver Cromwell in England. Besides, it was not very easy for the poor people to believe that so fine a gentleman as Lafayette cared much about them; and the noblesse hated him because they thought he had deserted their order; and the queen and court disliked him because they thought he was trying to become dictator. At last, when there was a great riot, and Lafayette had to order his soldiers to attack the mob, the common folk liked him less than ever, and he found that even his soldiers were only half inclined to obey him. He always wanted to check violence; but he could not sway men as Mirabeau could sway even those who did not trust him. So when more violent men got the upper hand, Lafayette no longer commanded the National Guard. Later on, when France declared war against Austria and Prussia, he was sent to command the French army; but Paris became so disturbed that he wanted to take the French troops back there, and when he found that he could not do so, he would not remain in command, but left the country.

How Lafayette helped to bring back a king to France

As for what befell him afterwards, he was made prisoner by the Austrians, and after spending some years in prison he was set free. Later, he helped in the restoration of the Bourbon king;

THE ROYAL FAMILY CAPTURED BY THE MOB

With the fall of the Bastille the power of the French king was gone, for the destruction of that relic of tyranny showed the people their strength. Louis XVI. was brought from Versailles to Paris by the mob, and was little better than a prisoner in his palace. At last the king determined to escape with his family from Paris by night, but when the royal fugitives reached Varennes they were recognised and stopped, as shown in this picture.

The king and royal family, after their attempted flight, were brought back to Paris and carefully guarded in the Tuileries Palace. Led by fierce demagogues, the mob gradually became more violent, and on June 20, 1792, the anniversary of the oath in the tennis-court, forty thousand people marched to the Tuileries, burst into the palace, and insulted the royal family, as shown here. The queen is standing with her children behind a table.

This picture is from the painting by the well-known artist Alfred Elmore, R.A., by permission of the Art Union.

THE LAST DAYS OF THE KING AND QUEEN

Encouraged by their growing power, and exasperated by the foolish threats of the nobles and princes who had escaped from France, the leaders of the people decided to remove the royal family to the close confinement of the prison of the Temple, as seen here, and to destroy all aristocrats. In two or three days over a thousand prisoners were massacred, and no one knew how long he or she would be safe from the dreaded guillotine.

At last, on September 21, 1792, the monarchy was abolished in France, and a republic proclaimed. Shortly afterwards the king was separated from his family, brought to trial, and beheaded. *The Reign of Terror was now in full force, and, in the following year, Queen Marie Antoinette was also tried and condemned to death, as shown here. Whatever may have been her early follies, at her trial she acted in every way like a queen.

FALL OF THE REVOLUTIONIST LEADERS

In the French Revolution, so soon as one set of men obtained power they were destroyed by another set more extreme. The most bloodthirsty party was that of the Jacobins, who destroyed a far more able body known as Girondins. One of these Girondins was Madame Roland, a beautiful and clever woman, who did much to direct the Revolution. But she was imprisoned by the Jacobins in the prison of Saint Pelagie, as shown here, and then beheaded. On the scaffold she exclaimed: "O Liberty, what crimes are committed in thy name!"

The Girondins had been allied with the Jacobins, and together they overthrew the monarchy. But in the dreadful massacres of prisoners by the Jacobins the Girondins had no part, and, indeed, they had tried to prevent the bloodshed. Then, when the Jacobins, who were all cruel and bloodthirsty ruffians, felt sufficiently powerful, they sent the Girondins to the scaffold in large numbers, as shown in this picture. The mob in Paris enjoyed seeing the victims go to execution, and mocked them as they went through the streets to the scaffold.

The picture of Madame Roland at St. Pelagie is by Edouard Carpentier, and the lower picture is from a painting by the French artist Piloty.

and, at the end of his long life, he helped in another little revolution when the Bourbons were turned out again, and their cousin, Louis Philippe, was made king in their place.

Now let us look at the king and queen, whose story is so tragical. Louis always meant well, and would have been quite willing to grant much more power to the people, and to put an end to bad laws and customs; but the people round him were always persuading him that if he allowed one thing or another to be done, the king would never again have any power; and Louis thought that a king had no right to give up his power. So he could never make up his mind either to trust Mirabeau or any other of the leaders of the people, or, on the other hand, to take up his stand boldly as a monarch who was determined that his own will should be obeyed. In one way he was a brave man, for he had no fear of death, but he had not the other kind of courage which enables a man to resolve on a plan of action in which there are risks, and to carry it through in spite of dangers and difficulties.

How the King and Queen Tried to Escape from France in the Dark

Soon after the death of Mirabeau, the king and queen thought the best thing they could do was to take flight out of France, and then perhaps other kings would help them to recover their power, for the queen was the sister of the Emperor of Austria.

They made preparations secretly, and fled by night from Paris in a carriage, pretending to be just a gentleman and his wife. But at a place near the frontier, the king was recognised when he got out of his carriage, and they were stopped and sent back to Paris, where they were kept prisoners. Louis accepted the new constitution, or rules for governing the country, which the Assembly had prepared, and so he was still king. A new Assembly was called, but the king had no able men about him now whom he could make ministers, and the cleverest men whom he tried would not do as he wished, or serve him if he did not do as they wished. At this time, because the Austrian Emperor and the King of Prussia threatened to interfere, Louis was forced to declare war against them. And at the same time the men who were called Jacobins, which was the name of a club or association to which they belonged, were stirring up feeling against the monarchy, and Paris was getting very much excited.

A Mob that Broke into a Palace and Made the King Wear a Red Cap

One day there was a great procession, which found its way into the royal palace of the Tuileries; and the King of France was obliged to set on his head the red cap of liberty. The queen, too, had to set one on the head of the little Prince Royal, the heir to the throne. No real harm was done that time; but when ill news came from the war, and the Prussians made a proclamation that Paris would be punished if the king were hurt, the people became furious. The royal palace was attacked by a mob thirsting for blood; the valiant Swiss Guards, who defended it stoutly, were cut to pieces. But the king and queen had fled with the rest of the royal family, and taken refuge with the Assembly. Then, later, there came another new Assembly, which was full of Jacobins, and of others who wanted a republic, who were called Girondins; and the new Assembly proclaimed that France was now a republic and the king and queen were merely citizens. And even before this the Jacobins had put to death a number of royalists, or supporters of the king, who had been thrown into prison, in what were called the September massacres. The next thing was to bring the king himself to trial, as Charles I. had been tried in England just 140 years before. He was tried by the Assembly itself, and condemned to death.

A Royal Prince who Voted for the King's Death

Like Charles the First, Louis showed a royal dignity and fortitude. He was beheaded, not with an axe like Charles, but by an instrument called the *guillotine*, which had been brought into regular use in France by this time. King Louis's own cousin, Prince Philip of Orleans, was one of those who voted for his death.

The poor queen and her children remained prisoners for a long time. Marie Antoinette greatly deserves to be pitied, for though she had not always been wise, yet, when misfortune came upon her, she behaved with splendid courage; and

THE END OF THE LEADERS OF THE TERROR

The most ferocious villain in the Reign of Terror was Marat, one of those monsters whom Nature rarely produces. Even his bloodthirsty associates shunned him, and his very appearance struck terror. A beautiful young woman named Charlotte Corday, whose lover Marat had caused to be assassinated at Caen, determined to rid her country of such a ruffian. Going to Paris, she went to Marat's house and stabbed him

Less ferocious, though not less thirsty for blood, Robespierre was for a time the leader of the Terror, and day after day victims went to the guillotine at his bidding, until at last his associates and the people became tired of so many executions. Robespierre was denounced arrested, and suffered on the guillotine to which he had sent so many others. With his death the Reign of Terror ceased, and gradually peace and safety returned

Photographed by permission of Messrs. Braun Clement and Company.

it has always been counted among the wickedest deeds of the Jacobins that she, too, was sent to the guillotine by them, nearly a year after her husband.

She was not yet forty years old when she was slain; but the long, terrible months of anxiety had changed her so, that she seemed almost an old woman. When she became Queen of France, she was still a beautiful and attractive girl who had never known what it was to have her will crossed, and had been taught to take it for granted that kings and queens have a right to go their own way, so that she always encouraged the king to resist. When she died, she died like a queen.

One woman is famous who was on the side of the Revolution. The party who wanted a republic in France was divided in two, the Girondins and the Jacobins; and of these the Jacobins were much the fiercer. For the Girondins wanted a republic like that of ancient Rome; they did not wish to destroy for the pleasure of destroying.

THE NOBLE MADAME ROLAND, WHO DIED BECAUSE SHE TRIED TO SAVE OTHERS

Among the Girondins, Madame Roland had great influence, and was accounted a woman both noble and wise. But after the king had been slain, the Jacobins got the upper hand altogether, and turned upon the Girondins, who wished to check bloodshed. Many of them were flung into prison, among whom was Madame Roland; and many were sent to the guillotine, though they had striven their hardest for liberty. And so it was that Madame Roland died in the same way as Marie Antoinette.

We have not much space left for talking about the men who wrought the worst evils in the Revolution. There are three who are commonly named together, and of these one came very near to being a great man. This was Danton—terrible, fearless, ruthless. It was he who caused the September massacres, because he thought that was the only way to make sure that there would not be a rising of the royalists, just at the moment when it seemed that foreign armies might be marching on Paris. And it was he who spoke these fierce words, when the kings of Europe seemed to be gathering their forces to crush the French Republic: "To the kings, we will fling down the head of a king as the gage of battle"—meaning that Louis should be beheaded. But after that he would have joined hands with the Girondins in checking bloodshed, but they would not join with him; so he held by the Jacobins, yet still strove to stay their bloodthirstiness, desiring only to slay when he thought it needful to make opponents afraid. And again the more cruel among them got the upper hand, and Danton, in his turn, was sent to the guillotine.

HOW A YOUNG GIRL RID FRANCE OF A BLOODTHIRSTY TYRANT

The second of the three was Marat, who called himself the "friend of the people," foul of speech, craving for blood, ever urging death for the aristocrats. He did not die by the guillotine, for his wickedness so stirred the heart of a girl named Charlotte Corday that she thought it was her mission to free the world from such a monster. So she came to Paris, and, being admitted to speak with him, drew a dagger and slew him; for which deed she, too, gave up her life under the guillotine.

The third was for a time the most powerful of them all. This was Maximilian Robespierre, a little, unhealthy-looking man, who would have been simply a very respectable citizen if he had remained in private life. But he had one idea in his head which he was quite determined to carry out. This was that the will of what he called the "Sovereign People" must rule, and the way to bring that about was to destroy everything that could possibly stand in the way—kings or aristocrats, Girondins or Jacobins, men or women, young or old. He got all the power in his own hands, till at last, week after week, the guillotine was killing fifty people every day.

THE END OF THE TERROR AND THE DEATH OF ROBESPIERRE

Then even his own supporters grew weary and disgusted, and turned upon him; and he, too, went to the guillotine. When his head fell, those who stood by shouted for joy. With his death, the Reign of Terror came to an end, and the ruling of the French Republic passed into the hands of a group of people called the Directory. How in after time Napoleon Bonaparte first served the Republic, and then overthrew it and made himself emperor, we read on another page.

The next Men and Women begin on 4097

South view of Rugby schools and dormitories as they were in the days of "Tom Brown."

TOM BROWN'S SCHOOLDAYS

THIS is a celebrated story of English school life. It was written in 1856 by Thomas Hughes, an eminent lawyer and judge, but, better still, a true-hearted Englishman and helper of the poor. Judge Hughes was born October 23, 1823, and died March 22, 1896. He was educated first at Rugby, under the famous Dr. Arnold, and afterwards at Oxford. This famous story is largely an account of his own experiences, and we are not far wrong in reading Thomas Hughes where it says Tom Brown. He also wrote "Tom Brown at Oxford," but that is not quite so delightful a book as its forerunner, perhaps because it is more difficult to interest us in the life of a young man than in the doings of a merry schoolboy.

CONTINUED FROM 4024

IN the royal county of Berks, and in that part of it known as the Vale of White Horse, lived Squire Brown, Justice of the Peace for the county. He was a man of strong democratic opinions, and had no prejudices against his fellow-men less blessed than he with worldly wealth.

The life of the Brown household had always been simple and uneventful, the squire's chief diversions being a visit twice a year to Reading and Abingdon at the time of the assizes or quarter sessions. Tom's mother was a very practical country lady; and, indeed, her thoroughgoing qualities had earned for her the title of "Madam Brown." Under the guidance of his alert and sensible mother, Tom's character had been shaped in the right direction from his earliest years; while his father believed in letting him mingle with the boys of the village, instead of keeping him aloof from them, as only by mixing with others are the rough edges of our character smoothed down. For this reason the squire provided the village boys with a fine cricket-pitch, and even supplied them with bats and balls. None of the cricketers were more enthusiastic for the game than young Tom Brown; and while this was excellent in its way, it ceased to be so when Tom's devotion to the game led to his inducing his playmates to stay away from school and play cricket. The village schoolmaster had to complain of this to the squire, and perhaps it was in consequence that Tom was sent off to a private school at the age of nine. His departure from the village was the cause of great regret to all the boys, with whom he had been vastly popular—perhaps in some degree because he had preferred cricket to study.

His life at the private school was by no means a pleasant change to him. For the first time, he found himself subjected to supervision out of school as well as indoors. The two ushers were weak, characterless fellows, who allowed the older boys too much freedom and were over-strict with the young. Tale-bearing, spying, and all sorts of petty meanness

were regular features of the place, much to Tom's disgust. He, however, imbibed a fair amount of Latin and Greek, but in the holidays was constantly wanting the squire to send him to a public school.

Great was his joy, therefore, when in the middle of his third half-year, in October, 183—, fever broke out in the village, and, the master having himself slightly sickened of it, the whole of the boys were sent off at a day's notice to their respective homes. The squire was not so pleased as Master Tom to see that young gentleman's brown, merry face appear at home some two months before the proper time for Christmas holidays; and, thinking what had best be done with him, he decided to send him to the famous school at Rugby, where the head-master had kindly agreed to let him enter at once for the last six weeks of the term.

Tom's father accompanied him into London to see him off in the Tally-ho coach for Rugby, and gave him, in his own blunt way, some good advice.

TOM BROWN IS TO GO TO RUGBY SCHOOL, AND RECEIVES SOME GOOD ADVICE

"And now, Tom, my boy," said the squire, "remember you are going, at your own earnest request, to be chucked into this great school like a young bear, with all your troubles before you. If schools are what they were in my time, you'll see a great many cruel things done and hear a deal of bad talk. But never fear. You tell the truth, keep a brave and kind heart, and never listen to or say anything you wouldn't have your mother and sister hear, and you'll never feel ashamed to come home or we to see you."

It was three hours before dawn that the Tally-ho left the Peacock Inn at Islington with Tom seated on the top; and a stage-coach journey on a cold November night for a boy of ten was certainly no joke, so that long before Rugby was reached the young passenger on the roof had learned a very useful lesson in endurance.

From the old guard of the Tally-ho Tom heard many tales of life at Rugby and of the pranks played there by the schoolboys. So eager was he to know of the new life into which he was to enter that he plied the guard with question after question, until the old fellow not only brushed up his memory, but drew a little on his imagination, though all he said was accepted by Tom in perfect faith.

"Werry out-o'-the-way place, sir; no paving to streets, nor no lighting," was how he pictured Rugby. "Mazin' big horse and cattle fair in autumn—lasts a week; just over now. Takes town a week to get clean after it. Belong to school, sir?"

WHAT THE OLD GUARD OF THE TALLY-HO TOLD HIS YOUNG PASSENGER

"Yes," said Tom, not unwilling for a moment that the guard should think him an old boy. But then, having some qualms as to the truth of the assertion, and seeing that if he were to assume the character of an old boy, he couldn't go on asking the questions he wanted, added: "That is to say, I'm on my way there. I'm a new boy."

The guard looked as if he knew this quite as well as Tom.

"You're werry late, sir," said the guard; "only six weeks to-day to the end of the half." Tom assented. "We takes up fine loads this day six weeks, and Monday and Tuesday arter. Werry free with their cash is the young gen'lemen. But, bless you, we gets into such rows all 'long the road, what wi' their pea-shooters, and long whips, and hollering, and upsetting everyone as comes by; I'd a sight sooner carry one or two on 'em, sir, as I may be a carryin' of you now, than a coach-load."

"What do they do with the pea-shooters?" inquired Tom.

THE STIRRING STORY OF THE BATTLE OF THE PEA-SHOOTERS

"Do wi' 'em? Why, peppers every-one's faces as we comes near, 'cept the young gals, and breaks windows wi' 'em too, some on 'em shoots so hard. Now, 'twas just here last June, as we was a-driving up the first-day boys, they was mendin' a quarter-mile of road, and there was a lot of Irish chaps, reg'lar roughs, a-breaking stones. As we came up, 'Now, boys,' says young gent on the box—smart young fellow, and despret reckless—'here's fun! Let the Pats have it about the ears.' 'Easy there, sir,' says Bob—that's my mate, the coachman—'don't go for to shoot at 'em, they'll knock us off the coach.' 'Hang it, coachee,' says young my lord, 'you ain't afraid. Hoora, boys, let 'em have it!' 'Hoora!' sings out the

others, and fill their mouths chock full of peas to last the whole line. Bob, seeing as 'twas to come, knocks his hat over his eyes, hollers to his 'osses, and shakes 'em up, and away we goes up to the line on 'em, twenty miles an hour.

"The Pats began to hoora, too, thinking it was a runaway, and first lot on 'em stands grinnin' and wavin' their old hats as we comes abreast on 'em; and then you'd ha' laughed to see how took aback and choking savage they looked, when they gets the peas a-stinging all over 'em. But, bless you, the laugh weren't all on our side, sir, by a long way. We was going so fast, and they was so took aback, that they didn't take what was up till we was half-way up the line. Then 'twas look out all, surely.

"They howls all down the line fit to frighten you, some on 'em runs arter us and tries to clamber up behind, only we hits 'em over the fingers and pulls their hands off; one as had had it very sharp act'ly runs right at the leaders, as though he'd ketch 'em by the heads, only luck'ly for him he misses his tip, and comes over a heap o' stones first.

How the "young gen'lemen" paid for the damage they had done

"The rest picks up stones, and gives it us right away till we gets out of shot, the young gents holding out werry manful with the pea-shooters and such stones as lodged on us, and a pretty many there was, too.

"Then Bob picks hisself up again, and looks at young gent on box werry solemn. Bob'd had a rum 'un in the ribs, which'd like to ha' knocked him off the box, or made him drop the reins. Young gent on box picks hisself up, and so does we all, and looks round to count damage. Box's head cut open and his hat gone; 'nother young gent's hat gone; mine knocked in at the side, and not one on us as wasn't black and blue somewheres or another, most on 'em all over. Two-pound-ten to pay for damage to paint, which they subscribed for there and then, and give Bob and me an extra half-sovereign each; but I wouldn't go down that line again not for twenty half-sovereigns."

After this graphic description the guard shook his head slowly, and got up and blew a clear, brisk toot, toot.

"What fun!" said Tom, who could scarcely contain his pride at this exploit of his future schoolfellows. He longed already for the end of the half-term that he might join them.

Tom had not time to alight from the stage-coach, as it slowed down at Rugby, before one of the boys came running from the school, and, jumping up behind, announced to Tom that his name was East, and his aunt, who lived down in Berkshire, had written to him to look out for young Tom Brown.

Tom arrives at Rugby and finds an unexpected friend there

This was indeed a jolly reception for the lonely traveller, and he and East were chums at once, for the lad was of a frank and friendly disposition, and introduced Tom to all his own particular friends forthwith.

Nothing could exceed the new boy's interest in all the features of the famous school; the study-room, with its sporting pictures, its cricket-bats, fishing-rods, and climbing-irons, seemed to him more interesting than Windsor Castle itself. At the dinner-table he was a little subdued; but to East's tales of the football field and its numerous accidents he listened as to the battle stories of a veteran. In the big room all the scholars now assembled to answer to their names, and it was with a thrill of pleasure Tom made his first response as a public-school boy.

Tom was in luck's way, for this day of his arrival was signalised by the School-house match, in which East counted himself a tremendous hero to be permitted to play on the School-house side.

Tom's first great football match, and how he acquitted himself

It was indeed a great sight for Tom, this first football match on a grand scale in which he was to take his place. For the School-house team of some fifty boys, who were distinguished by white trousers, in which they felt abominably cold that November day, had to meet and do battle with all the rest of the school.

Such excitement Tom had never witnessed. Nothing approaching the scrummages had he ever imagined, and in this breathless match Tom was to have his share. For the ball rolled slowly in behind the School-house goal, not three yards in front of a dozen of the biggest School players-up.

There stood the School-house præposter, safest of goalkeepers, and Tom Brown by his side. Now is your time, Tom. The blood of all the Browns was up, and the two rushed in together, and threw themselves on the ball, under the very feet of the advancing column; the præposter on his hands and knees arching his back, and Tom all along on his face. Over them toppled the leaders of the rush, shooting over the back of the præposter, but falling flat on Tom and knocking all the wind out of his small carcase.

OLD BROOKE, THE CAPTAIN, DECLARES TOM IS A PLUCKY YOUNGSTER

"Our ball," said the præposter, rising with his prize. "But get up there, there's a little fellow under you."

They were hauled and rolled off him, and Tom was discovered a motionless body.

Old Brooke, the captain of the eleven, picked him up.

"Stand back, give him air," he said; and then feeling his limbs, added: "No bones broken. How do you feel, young 'un?"

"Hah-hah," gasped Tom, as his wind came back, "pretty well, thank you—all right."

"Who is he?" said Brooke.

"Oh, it's Brown, he's a new boy; I know him," said East, coming up.

"Well, he's a plucky youngster, and will make a player," said Brooke.

And five o'clock struck. "No side," was called, and the first day of the School-house match was over.

THE NEW CHUMS GOSSIP BY THE FIRE AND PREPARE FOR "THE SINGING"

Tom soon recovered from his shock, entering with real zest into the life of the school. Over the fire they sat discussing the great match and other adventures of the football field until it was time to go to their rooms and wash up for the singing.

"What's that?" Tom asked; and East explained that on the last six Saturdays of the term there was singing, as there were no first lessons to do, and "you can lie in bed to-morrow morning."

"But who sings?" asked Tom.

"Why, everybody, of course; you'll see soon enough. We begin directly after supper and sing till bedtime."

Supper-time came in due course at seven o'clock. The meal consisted of bread and cheese and beer, which were all saved for "the singing"; and directly afterwards the fags went to work to prepare the hall. Each new boy of that term was placed on the table in turn and made to sing a solo, under the penalty of drinking a large mug of salt and water if he resisted or broke down. Tom sang an old West-country song, "The Leather Bottél." Many jolly songs were sung, particularly when the fifth and sixth form boys came in, and old Brooke, who was already a hero to Tom, made quite a good little speech as he was so soon to leave the school after eight years.

"Now, I'm as proud of the house as anyone," he said. "I believe it's the best house in the school, out-and-out. But it's a long way from what I want to see it. There's a deal of bullying going on, and, depend on it, there's nothing breaks up a house like bullying. Bullies are cowards, and one coward makes many; so good-bye to the School-house match if bullying gets ahead here."

TOM BROWN COMES IN FOR HIS TOSSING IN THE BLANKET

Old Brooke's speech, which was quite a long one for him, was received with great applause and approval, and many glances were made in the direction of Flashman and other fifth form boys who delighted to bully their juniors. The singing meeting was ended by the entrance of the head-master, cap on head and book in hand, who led the whole company in prayers, after which they indulged in the time-honoured custom of tossing the new boys in a blanket, an ordeal through which Tom went without flinching.

Thus began Tom Brown's life at Rugby, and a more exciting day for his entrance there could not have been chosen. He shared the fun of it with the new boys who had been there from the beginning of the term. The sermon which he heard the doctor preach on the Sunday revealed to him the strong and noble character under whose guidance he had been placed. For every boy in the school was sooner or later bound to come into personal touch with the head-master. Tom was installed in the third form, but

as he had already been well grounded in grammar, the master considered he had been placed too low, and gave so good a report of him at the end of the term that he won his remove to the lower fourth, where all his School-house friends were, so that his delight in being a Rugby boy was now supreme.

When Tom returned to Rugby for the beginning of the second term, and found himself the possessor of a desk in the lower fourth, that was something of a temptation to him, as he used the desk for other purposes than study, and was thrashed in consequence, while the whole form made a very poor appearance before the head-master at the monthly examination. Tom's reputation for steadiness suffered in consequence, but there was another direction in which he ought in fairness to have recovered his good name.

THE TWO CHUMS TEACH SOME OF THE BIG BULLIES A NEEDFUL LESSON

Flashman, the most notorious of the bullies, was so unfair and even brutal to the younger lads whom he made to fag for him that Tom and East, on whom the bully had also tried his work, decided to rebel, and maintained a steady opposition to Flashman and his friends. It was not that they objected to doing the duty of fags, which was expected of them by the fifth form, but simply as a protest against the bullies, and the youngsters succeeded in inflicting a severe punishment upon Flashman.

But the result of it was that Tom and East gained the reputation of shirking fag duty, and Tom, having broken other rules of the school, particularly one as to fishing from a prohibited part of the River Avon, found himself before the head-master and in danger of expulsion, unless he undertook to mend his ways. This he did, and was as good as his promise, for on his return to school next term he was invited by the wife of the head-master to take tea with her, and was told he was to have the Gray study, which was a favourite one, and that she would like if he would take under his care a new pupil, named George Arthur, who was in delicate health, and had never before been away from home.

Somewhat reluctantly, Tom undertook this responsibility, as it would interfere with other private plans of his. Arthur proved a gentle young lad, who in the dormitory that night, unlike most of the boys, knelt by the side of his bed for prayers, and was jeered at in consequence by one of the others, who threw a slipper at him. Tom quickly met the situation by letting the boot he had just pulled off fly at the head of the bully.

TOM AS THE CHAMPION AND DEFENDER OF ONE OF THE NEW BOYS

"If any fellow wants the other boot," he exclaimed warmly, "he knows how to get it!"

The little scene had an influence on some of the boys in the room, and on Tom most of all. Next morning he began the day by silent prayer at his bedside, and there were others who followed his example. This was the immediate result of his taking care of Arthur.

Arthur was greatly interested in birds and animals, and soon made friends with Martin, one of the school's curious characters, who tamed snakes and kept birds in his study. Together they went exploring in the woods, and Tom had more than once to get them out of scrapes. It was over Arthur, too, that Tom had his last fight in the school with a bully named Williams, who had promised to thrash little Arthur for some fancied insult. He was challenged by Tom, and the fight was at its hottest, with Tom getting the best of it, just as the doctor arrived to put a stop to it. Williams profited by the encounter, as it cured him of his bullying, and made him a firm friend of Tom's.

THE HAPPY TRIO, AND HOW THE WEAKEST HAD THE GREATEST POWER

Two years after the events recorded, Arthur, who was now sixteen, and was an apt and bright scholar, was at the head of the twenty. Both Tom and East were far less successful in their studies, and were none too highly placed in the fifth form. It was a very happy friendship, however, for Tom and East, with their fine manly characteristics and their physical powers, felt the refining influence of Arthur's gentler nature, and were the better in consequence, while he was sheltered from the buffetings of the school by having such manly chums.

Arthur was one of several scholars who took the fever and had to be sent home until he was recovered. Before going away he said to Tom there was one favour he had to ask of him. It was that he would give up the *vulgus* books and cribs, by which he meant that Tom had not been doing his Latin and Greek exercises honestly, but using translations. Tom looked away at this, and then, catching his friend's gaze, asked: "Why?"

"Because—because you're the honestest boy at Rugby, and that isn't honest."

Arthur soon brought Tom to his way of thinking, and had his promise. East had also been guilty of cribbing, like Tom, but he was now brought to honest study as the result of Tom's promise to Arthur, and from that time forward both derived a satisfaction and pleasure from their studies which before had been unknown to them.

TOM'S LAST YEAR AT RUGBY SCHOOL, AND WHAT HE LEARNED THEN

So two more years passed away, and it was again the end of the summer term. An important cricket match was to take place, and there was a union of old boys. On the slope towards the cricket ground stood three of the elder scholars. There was one slight of build, with bushy eyebrows and a dry, humorous smile, while by his side was another of manly form, almost six feet tall, tanned of face, with curly brown hair and sprouting whiskers, his laughing eyes gleaming below his smart straw hat. He was dressed in a white flannel shirt and trousers, with the captain's belt about his waist, and on his feet were yellow cricket shoes. This was our hero, Tom Brown, now nineteen, a præposter, or monitor, and captain of the eleven. East was he of the bushy eyebrows, and the third slight but well-knit and active figure was Arthur, greatly improved physically and as bright as ever.

The master of Tom's form came up just then and invited Tom to sup with him. At that meal Tom learned for the first time how the great and noble man who was the head-master of Rugby had carefully planned for the moulding of Tom Brown's character. Tom had fondly supposed his progress was due largely to his own foresight, but now he could understand that it was by choosing him as a protector of Arthur, thus giving him a new sense of responsibility and trusting him, and by many other little things, which he now saw in a new light, that the great Dr. Arnold had brought out the best of what was in his scholar's nature.

AFTER HIS RUGBY DAYS TOM MAKES A PILGRIMAGE TO THE OLD SCHOOL

It was the year 1842, when Tom was on a fishing holiday in the Scottish Highlands, that his companion, reading from a newspaper, said: "Here's something for you, Tom. Why, your old master, Arnold of Rugby, is dead."

"Let me look at the paper," said Tom, greatly agitated, and, turning over the leaves with trembling hands and swimming eyes, he managed at length to read the short announcement. Reading it again, he walked rapidly towards the inn, consulted the steamboat and railway guides, and, hastening to his room, was gone in an hour. In a day and a night he had reached Rugby, and at the school he found the old verger, Thomas, who looked up at him through his spectacles, and Tom seized his hand and wrung it.

"Ah, you've heard all about it, sir, I see," said the verger.

"Yes. Where is he buried?"

"Under the altar in the chapel, sir. You'd like to have the key, I fancy."

THE DEATH OF THE HEAD-MASTER, AND HOW IT AFFECTED HIS OLD PUPIL

In the chapel all was still as death, and, groping his way almost blindly there, Tom went to his old seat and bowed his head, while the tears came quickly to his eyes. A strange sense of loneliness was with him, the consciousness of a great loss. At the altar he prayed until he felt the peace that comes from prayer, and then, going out into the fresh air, he walked about the close and the cricket fields and up to the old school grounds. Nothing was changed, yet the saintly Dr. Thomas Arnold, the life and soul of it, was no more.

But the teaching of him who was gone still endured and influenced the young man who stood there, conscious that what remained for him to do was enough for all: to labour and be true and strong.

The next Famous Books are on page 4171.

A WOMAN'S RIDE IN THE SEA

CONTINUED FROM 4010

BATTLING with the fierce winds and heaving waves in the effort to save life is hard work for strong men, and yet how many times have brave women risked their lives and faced the most appalling dangers in order to rescue men and women and children from a watery grave.

Some years ago a lady, named Miss Grace Bussell, who lived at Wallscliffe, in Western Australia, was reading in the drawing-room of her father's house, when a native servant rode up to the front door to say that a ship had been wrecked about seven miles down the coast, and was fast going to pieces on the rocks. A hurricane was blowing at the time, and the sea was lashed into a fury by the fierceness of the wind.

Without a moment's hesitation Miss Bussell ran to the stable, and, jumping on her father's horse, a fine animal, galloped off down the coast with the servant. The ship was about two hundred feet from the shore, and the waves were dashing over it in such a way that it was clear the vessel could not hold together very long.

The crew attempted to land some of the passengers in the ship's boat, but the boat had scarcely left the wreck when a large wave caught the little craft as though it were a cork and turned it right over, so that all the occupants were hurled into the sea in a moment.

It was at this moment that Miss Bussell arrived at the spot directly opposite the wreck, and she immediately dashed into the angry sea and guided her brave steed towards the place where the people were struggling in the water. The servant followed her on his horse, and together they managed to bring a large number of the half-drowned people in safety to the shore.

Again and again did Miss Bussell go out to battle with the storm and waves, and it was only with the greatest difficulty that she could keep her seat upon the horse's back. But each time she managed to reach the struggling victims of the wreck, and, swimming hither and thither among them, enabled some half-dozen or so to cling to the saddle or horse's mane and tail, and so assisted them to the shore.

The risk was very great, and on each occasion that Miss Bussell turned her horse's head towards the wreck, after bringing a party to land, it seemed that she could never succeed in her purpose. Still more impossible did it seem that she could ever reach the shore again with her living load. But her great pluck and determination and skill, and the strength and endurance of her fine animal, enabled her to perform the apparently impossible; and by dint of these repeated exertions the passengers and crew were, in due

time, saved, including the men and women and the little children who had been on board. The last man was saved by the servant, Samuel Isaacs, who swam his horse out and rescued him just as he was about to sink.

Once, when Miss Bussell was bringing five or six exhausted people to shore, her horse's legs became entangled in a rope, and it looked as though nothing could save the party; but by clever handling Miss Bussell saved the animal from being washed over on to his side, and he was able to get his legs free of the rope. The medal of the Royal Humane Society was presented to the gallant lady for the wonderful bravery and courage she displayed on this occasion. Had it not been for her prompt and plucky action there would have been little hope for the passengers and crew, for on this part of the Australian coast there was not, at that time, any proper life-saving apparatus provided.

A BRAVE BOY'S REMARKABLE SWIM

Few names are more honoured in the annals of the British Navy than that of Sir Cloudesley Shovel, whose remains lie buried in Westminster Abbey. This brave but ill-fated admiral lost his life on a foggy October night in 1707, off the Scilly Islands, when his ship struck upon a rock, and went down with 800 men on board.

When a boy, young Shovel, whose parents were very poor, was apprenticed to a shoemaker; but he disliked the trade, and, having a longing to go to sea, he ran away from his master, and engaged himself as cabin-boy on a warship. Those were times of stress in the British Navy. England was at war with France, and it was not long before the boy saw active service.

He determined to make himself thoroughly proficient at his duties, and although as cabin-boy he had plenty of work to do, he still found time to study the principles of navigation. He was very brave, and his pleasing disposition endeared him to both the officers and men of the boat on which he sailed, for he was always ready to do anything for anyone, whether it were part of his regular duties or not.

During an engagement, young Cloudesley Shovel was on board a vessel upon which was the British commander, Sir John Narborough, and Sir John expressed an earnest desire that means might be found of conveying some important orders to another ship that lay a considerable distance away.

None of the older officers or men could offer any suggestion; but the boy, having overheard his commander's wish, approached Sir John Narborough, and begged that he might be allowed to carry the despatch. The officer looked at the boy in surprise, for it was hardly likely that a boy would have any useful or possible plan where able and experienced seamen failed.

"And how do you expect to get to the ship?" he asked.

"By swimming, sir," was the prompt reply.

"But the enemy are firing heavily all round, and it will be a very dangerous task."

"If I may be allowed to go, sir, I will undertake to carry the despatch safely to the ship."

Sir John Narborough was pleased at the confidence and bravery and energy shown by the boy, and, giving him the important document, he bade him make the attempt.

Cloudesley Shovel divested himself of nearly all his clothes, then, taking the despatch in his mouth, he jumped into the water, and struck out for the other ship. The path lay across the enemy's line of fire, and the shots were striking the water all around. But, by what seemed a miracle, he escaped, and, swimming hard all the time, he at last reached his destination, and was able to deliver the despatch safe and sound.

It was indeed a remarkable feat for a boy, and Shovel soon rose to be an officer, and eventually an admiral and a knight. In addition to many exploits in regular warfare, he did much good in suppressing piracy in the Mediterranean Sea, at a time when the people of the Barbary States lived largely by preying upon the commerce of other nations.

In 1674, as a lieutenant under Sir John Narborough, he punished the pirates very severely at Tripoli, burning no fewer than four of their ships under the very walls and castles of their stronghold.

A BOY'S LOVE FOR HIS MOTHER

JEAN VIGIER'S mother was a widow with four sons, whom she found it difficult to bring up and to educate, for she was very poor. Kind friends found situations for the three elder sons, but the youngest, Jean, a clever, promising boy of nine and a half, they wished to keep at school. Yet they could not afford to do that and help the weakly mother at the same time; so it was decided that she must go to the hospital, while Jean stayed at boarding-school. Then the curé invited the boy to his house to tell him of this decision.

Now, Jean was rather inquisitive, and, when left alone for a few minutes, he looked at a paper on the curé's table, and he found that this paper was an order for his mother's admission to the hospital. Alarmed, the boy ran out of the house and back to school, where he put on his working suit. Then returning to the curé, he said: "I know it all; but mother shall *not* go to hospital. I am going to stay with her and support her."

The curé tried to reason with the boy, and pointed out that in the end it would be better for his mother if he were well educated, for then he could earn more money than if he remained ignorant. But Jean was not to be moved from his determination, and when he found his brothers were unwilling to help him, he sold his clothes and a watch he had received as a reward at school, and, with the proceeds, bought cakes and toys, which he hawked about the streets of Aurillac.

People liked to buy of the bright little fellow, especially when they knew how he loved and cared for his mother; and he prospered so that he was soon able to earn enough to support himself and her.

THE LOVE THAT IS STRONGER THAN DEATH

IN the turbulent times that followed the death of Julius Cæsar, Cicero and his brother Quintus were both placed upon the secret list of those who should be put to death. But, learning of their danger, they fled from Rome, and had gone some distance towards the coast, when they suddenly remembered that they had very little money with them.

Quintus thereupon undertook to return to the city for the necessary means, while Cicero proceeded on his flight. Arrived at Rome, Quintus made his way to his house, but his return was soon known, and soldiers were sent to kill him. He managed to conceal himself so well that, although the assassins searched the house, they could not find their prey.

This enraged them so much that they seized the son of Quintus, and put him to the torture to make him disclose his father's whereabouts. But although the pain was terrible, and the cruel torturers spared no means that their wicked ingenuity could think of, the brave young Roman remained firm, and absolutely refused to say where his father was hidden.

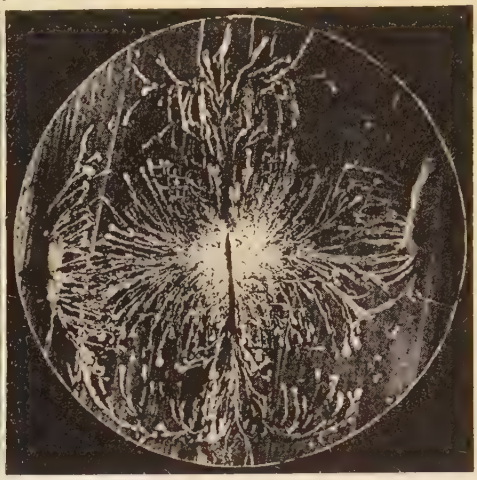
Again and again they applied the torture, and at last from time to time a groan escaped the suffering youth, which reached his father's ears. Quintus endured the agony of hearing his son's sufferings on his behalf for a little while, and then, bursting from his hiding-place, he surrendered to the soldiers, and begged them, with tears in his eyes, to kill him, but to spare the innocent youth who had done no harm to them or to their master.

But such a thing as pity was unknown to these base murderers, hired to do the wicked work of men as evil as themselves, and they only mocked at the father's prayers and the son's pain. They must both die, they declared: the father because he had been condemned, and the son because he had tried to conceal his father.

The unhappy pair accepted their fate with gallant resignation, but they now disputed as to who should suffer first, each desiring to be the earliest victim, so that the other might be spared a few moments more of life. The cruel assassins, however, settled the matter, and saved them both from the agony of surviving the other, even for a moment. The murderers divided themselves into two groups, and beheaded father and son at the same moment. Few more pathetic and inspiring instances of the mutual devotion of father and son are to be found in all history.

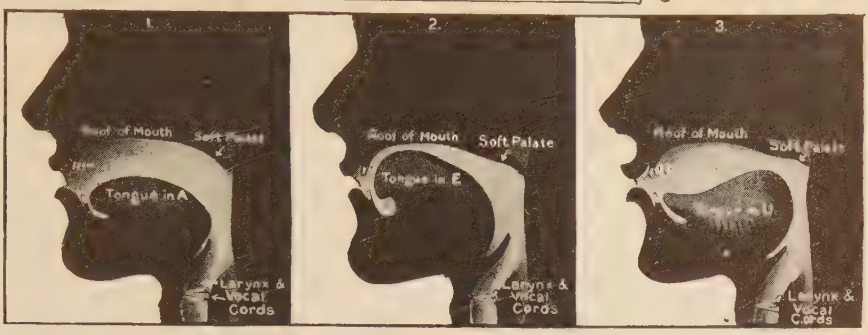
The next Golden Deeds are on page 4177.

PICTURES DRAWN BY THE HUMAN VOICE



No artist drew these designs. A thin sheet of india-rubber was stretched over a vessel like a cup which had a spout at the side. Some light powder was then thrown upon the rubber covering, and when someone sang into the spout, the powder formed itself into the design of the picture on the left. The right-hand picture, looking like a frosted window, was drawn in the same way, but, instead of powder, moist paint was put on the rubber covering.

To obtain the left-hand picture, a sheet of glass was coated with paint and put over the cup, with the paint resting on the rubber covering. Then, as the spout was sung into, the glass was moved round, and this beautiful design appeared. The picture on the right—something like a fern-leaf—was made by singing louder and having moister paint on the glass. The cup with a spout or tube is called an eidophone, which means "form of the voice."



In these pictures we see the positions taken by the tongue and lips when different vowels are pronounced. The position of the larynx remains the same, the different sounds being produced by the changed position of the resonators, or cavities above the larynx. The vowels shown are A, as in father, E, and U

TALKING AND SINGING

CONTINUED FROM 3958

WE know how the larynx, or voice-box, the musical instrument which we all possess, produces notes of any particular pitch that we desire. But though singing is very delightful and precious, and though many books might be written upon the voice-box and its use in singing, speaking is really much more important than singing, and therefore it is necessary to study speaking from the point of view of the machinery by which it is done.

We have already learnt about the wonderful centre in the brain where words and the meaning of them are stored, and we understand that everything else depends upon the orders given there, but now we must go on to study the machinery by which those orders are carried out. The voice-box is, of course, the central part of this machinery, but it is not all; and, indeed, everyone knows, who has whispered, that it is possible to speak without the voice-box at all.

There is one point which has been greatly discussed by many thinkers, and which we must mention first. We know that we ourselves both speak and sing, and when we observe the birds, we find that they sing, but do not speak. The question is: Did singing or speaking come first? And there is a difference of opinion on this matter. A great Frenchman, named Diderot, at the end of the eighteenth century, and Herbert Spencer, many years after, supposed that singing came later than speaking. Their argument was that, after learning merely to speak, the time came when men wanted to make their speech more effective and thrilling and moving, and so they sang the words instead of only speaking them. So on this theory speech came first, and song is a sort of speech with more effect added to it by the addition of music.

But against these great opinions there is another great opinion—that of Charles Darwin. For many years he studied the expressions of feeling in man and in the lower animals. He found, as he thought, that many of the lower animals, especially the birds, sing of set purpose, so to speak, and perhaps sing very beautifully. He supposed that the special reason for the song of animals was to call each other and to please each other. Now, on this view, song came first with the animals, and speech afterwards with man, and that is what Darwin maintained.

This is a subject which the writer of this story has specially tried to study, and what he thinks is that in the case of mankind speech and song have arisen together. They are really two varieties of the same thing,

which is expression by means of the voice. The argument of Diderot and Spencer that speech came first and song afterwards is not supported by the fact that, when we observe the growth of very small children, we can see the beginnings of speech and of singing growing up at one and the same time in them; nor is there any reason at all why this should not be the case. However this may be—and it is at least an interesting subject to think about—let us now go on to study what happens when we speak.

WHY IT IS THAT WE USE DIFFERENT NOTES IN SPEAKING

First of all, let us discover what is the difference between singing and speaking. In both cases we produce sounds by means of the voice-box, except in whispering; in both cases these sounds are musical notes—that is to say, the waves which form them are regular; in both cases there are changes of pitch.

No one speaks with his voice all the time on the same note, even in the shortest sentence. We raise the voice sometimes, we lower it at other times, as we go along, and we convey a great deal by the way in which we do this; so much so, that children or foreigners, who do not understand the words we are saying, may learn a great deal from the pitch of the notes we speak in.

Even a dog or a horse will learn much from our voices in the same way. If anyone doubts that we use a number of different notes when we speak, let him get someone to say a sentence all on the same note, without raising his voice or lowering it. The Greek word for one is *monos*, and so, when something is spoken or sung all on the same note, we say that it is a monotone, and thus we get the word monotonous.

HOW WE ARE ABLE TO PUT COLOUR INTO OUR VOICES

We could scarcely live with anyone who spoke in a really monotonous voice. Also, we use different loudnesses when we speak, and, apart from the actual note we are speaking on, we use different kinds of what is often called colour in our voices. We speak to a child in a more tender tone than we speak to a bus conductor, though we may speak more loudly to the child than to him. There are many different shades of expression which we can put into the same words spoken on the same notes and with the same loudness.

Now, the reason why it has been necessary to go so carefully into this is that we want to find out the difference between speaking and singing, and the first thing we find is that in all real points the singer does no more than the speaker does. He uses a variety of notes, he uses a variety of force, he uses a variety of colours. It may be added also that both singers and speakers use a variety of rhythm and speed.

But, nevertheless, no one will say that speaking and singing are the same, and everyone knows what it is to hear someone speaking in a sing-song voice. There is a common English word which has a very interesting history that bears on this point. It is the word cant. We say that a thing is cant or that a person is canting when we mean that he is professing high ideas that he does not really believe. The word comes from the Latin *canto*, I sing. Cant and chant are really the same word, and we might as well say that a person is chanting as that he is canting.

WHAT HAPPENS WHEN ANYBODY SPEAKS IN A SING-SONG WAY

The explanation is that at a very interesting time in the history of England there were certain people, having very strict views on many things, who had the habit of speaking in a sing-song way. When they spoke they rather chanted. Their enemies said that they did not believe what they professed, and so the word cant, which really means singing, came to mean insincerity.

Now let us ask what it is that happens when a person, who was speaking in the ordinary way, speaks in a sing-song way, or actually sings. What happens is that he now produces notes which have fixed regular intervals between them, like the notes on a piano. When we speak we do not use the fixed musical intervals of pitch, but slide the voice up and down, without taking any notice of the fixed intervals of music at all. It is true, also, that as a rule, when we speak, we may keep our voice within the limits of, perhaps, half an octave or less, while when we sing we may range over a couple of octaves or more. But though this is evident directly we think about it, it is not the

real difference between speaking and singing, which is that in singing we use only notes with fixed intervals between them, while in speaking we let our voice rest just where we please. If we think of a violin, we can, perhaps, understand this better. A player gets definite notes on the violin, such as the notes that are on the piano, by placing his fingers firmly on the strings at fixed intervals.

One of the great problems for the player is to get his fingers always at exactly the right places on the string. Now, when we sing, it is as if we were using just those intervals, only that, as we have seen, we do not get our notes by the violin player's method, but by tightening or loosening our vocal cords. If we do not use these intervals when we sing, people say that we are singing out of tune, and go out of the room as quickly as possible, and we are only asked to sing by people who have never heard us sing before.

WHY DIFFERENT PEOPLE HAVE DIFFERENT KINDS OF VOICES

But the violinist can also move his bow across a string and make it sound, while, at the same time, instead of stopping the string at certain intervals, he slides a finger right along the string. So, as the string gets gradually longer or shorter, he produces a series of notes—thousands in number really—which cannot be imitated on the piano. Now, our vocal cords can have any tightness or slackness, and so it is possible for us to pitch our voices, as we speak, at any point we like, just as if the violinist were to stop moving his finger at *any* point along the string of his instrument.

One of the great differences between voices is in the person's choice of the notes he speaks on. It might be supposed that if one did not sing, it would be all the same what notes one spoke on; but we all know that there are people to whose speaking it is a real musical delight to listen. It may be noticed sometimes that well-trained singers who sing quite well, but are not really musical, speak unmusically, and everyone knows cases of people who do not sing at all, but who have most beautiful speaking voices. To people with sensitive ears there is scarcely a greater delight in life than to be surrounded by people with beautiful speaking voices, and one of the reasons why we ought to study this question here is that we are running a grave risk to-day of losing the beauty of our speaking voices, and for several reasons.

THE GREAT CARE THAT SHOULD BE TAKEN OF THE VOICE IN LARGE FAMILIES

One reason is simply the way in which we crowd together. It is probably safe to say that more pleasant speaking voices come from small families than from large ones. If we are one of twelve children, and we want to be heard—well, we are rather apt to discover which is the most piercing tone we can produce, and then, perhaps, we use that all the rest of our life. People should take great care of their children's voices in this respect, especially when there are many children, and they all want to speak at once and be heard.

Perhaps it would be a good rule to listen first to the one who spoke most quietly and nicely. We have a little girl who can speak nicely when she tries, and we call that voice, after her real name, her Monica Mary voice; she also has a less pleasant voice which she uses when she is rather cross, and we call that her Jezebel Jones voice, after the name of the naughty little girl whom we suppose also to live inside her skin. Now, the rule—and a very good one—is that she never gets anything when she asks for it in the Jezebel Jones voice, but that we do our best when she uses the nice one. Long after we are gone, perhaps people will be grateful to us for having encouraged her to speak with a beautiful voice that gives pleasure and rest and peace to the people around her.

THE NOISES OF GREAT CITIES THAT ARE SPOILING THE MUSIC OF OUR VOICES

A second special reason why voices lose their beauty is the growth of cities and their noises. The louder the noises around us, the louder and more piercing our voices have to be, and the music of them deteriorates, both in the quality of the notes and in the pitch of the notes. When there is a noise going on all around us, we have no time to make our voices pleasant; we have to be heard. This question of noise naturally affects very much the voices of different classes of people.

A person who speaks in a high-pitched, harsh tone—as if he scarcely expected to be heard, but meant to have a try—tells us something about himself and his surroundings. Contrast that with the woman who speaks in a voice rather low-pitched, quiet, and musical. In so doing, she almost tells us—does she not ?—that she is accustomed to live in surroundings of peace and quiet where people do not interrupt each other, where no one shouts, and that she, indeed, would rather not be heard at all than make distressing noises. In perhaps the most heart-breaking scene he ever wrote, Shakespeare makes poor King Lear say of his daughter Cordelia : " Her voice was ever soft, gentle, and low, an excellent thing in woman."

To some children who read these words, this may appear not very important; but if we wait until we are unhappy, or until we are ill, or until we have to live with one and the same person all our life, then we shall find out what a difference it makes.

THE GREAT VALUE OF CULTIVATING A SOFT AND GENTLE VOICE

There are doctors and there are nurses who are worth far more than others are to their patients, not because they are cleverer or more conscientious, but because they have the kind of voice that often goes half-way to making a sick person well.

If the quality and use of the speaking voice were entirely a matter of the shape of the larynx, or voice-box, itself, then it would be quite useless to discuss this question ; but, in point of fact, the results depend upon deeper things than these, and very often the voice expresses nothing less deep than character. Children are wise in this respect, and often make very good judgments about people by their voices.

Every year hundreds of thousands of dollars are spent on singing lessons and on listening to singers. That is all very well in its way, but it is a curious thing that so few of us trouble at all about speaking lessons or about making any conscious effort at all to speak nicely. Parents will cheerfully spend large sums of money on having their children taught to sing, and will, at the same time, allow those children to talk regularly in a way which would distress any dog.

We already know upon what the pitch of the voice depends, and we know, too, that a tone of any given pitch may have different shades of colour, or quality. This is, at first, not easy to understand, but it becomes clear as we study sound in the STORY OF THE EARTH.

WHY WE CAN SING THE DIFFERENT VOWELS ON THE SAME NOTE

The fact is, that when we speak or sing on a given note, that note is really a mixture of a large number of notes. The lowest of these is the principal one, and is the one we hear best. But mixed up with it there are several others, called over-tones, which colour it and give it its quality.

Now, we all know that it is possible to speak or sing any of the vowels on the same note. When we read this, we should quietly say or sing *a*, *e*, *i*, *o*, *u* to ourselves on the same note—and, of course, these are by no means all the vowel sounds that there are. Now, if these are all on the same note, what makes the difference between them ? The whole difference between the vowels consists of a difference in the number and proportion and comparative loudness of the over-tones. When we sing *a*, *e* on the same note, the difference is that when we make the *e* we do something which alters the over-tones that made *a* ; and so, again, when we change the tone to *o* or to *ah*, or to any other.

If we carefully notice when we do this, we shall feel that something is happening inside our mouths. We are moving our throat in a different way ; we change the position and the shape of the tongue, or, in some cases—as when we change the sound to *o*—we move the lips.

HOW WE CAN MAKE DIFFERENT SOUNDS BY MOVING THE VOICE ORGANS

In all these cases the larynx is unchanged, and the vocal cords are just doing what they did at first ; but we are altering the shape of the spaces above the larynx—the *resonators*, as they are called—and so the over-tones are changed, and, instead of the particular set of over-tones which we have agreed to call *a*, there comes another which we have agreed to call *e*, and so on.

Children learn to make these sounds by imitation. That, by the way, is no explanation of how it is done, but still it is done. Now, youth is the time

for learning, and afterwards not only is it difficult to learn new things, but also it is difficult to unlearn what we learnt in youth. Different languages have different vowel sounds. Probably, on the whole, none of them is more difficult to learn to pronounce than any of the others. The question is really at what time in our lives we are asked to do so.

Every nation calls the sounds of the words of every other nation jaw-breaking for this reason. In English, for instance, we do not have the vowel sounds represented by the German *ü* or *ue*; nor has our *o* exactly the same sound as the Italian *o*. So we find it very difficult to make those sounds when we try to speak those languages, and, as a rule, we do not make them rightly. We may talk very good German or Italian, but the German or the Italian knows very well that these are not the languages we learnt from the cradle.

WHY A FOREIGNER CAN NEVER SPEAK ENGLISH PERFECTLY

In just the same way, a foreigner may use English far more cleverly and wisely than the English do, but though he lives half a century in England, and though he may be a very musical person, yet he will not make his vowel sounds quite correctly. The lesson of this is to teach us how marvellously delicate are the tiny movements of tongue and throat and cheeks and lips which decide the difference between *ham* as we say it, and *ham* as a German, speaking English, says it.

Another of the consequences of the fact that children learn by imitation is that if people, as children, have unfortunately heard the vowel sounds not quite rightly made, it is hard work, and perhaps impossible, for them ever afterwards to get them quite rightly. Now, to make the vowel sounds properly is a mark of having a delicate ear, and of having been surrounded by people who rather cared about these things, and so, though a man may speak beautifully and be a wicked man, or talk with a "shocking accent," as we say, and be a hero, it is worth while, perhaps, to pay more attention to this matter than many of us do. The number of possible vowel sounds is almost endless, for every possible position of the parts of the body concerned in speech will alter, by affecting the over-tones, the sound produced by the vocal cords, and so each of these positions will correspond to a different vowel sound. But, as we know very well, speech consists not only of vowel sounds, but also of consonants, like *b*, *c*, *d*, *f*, *g*, and so on, and of these, also, there are a very large number.

THE DIFFERENCE BETWEEN A VOWEL SOUND AND A CONSONANT SOUND

The first thing for us to learn is, what makes the difference between a vowel and a consonant, and there is no doubt at all as to the answer. The difference between a vowel and a consonant is the difference between a musical note and a noise—that is to say, the difference between a series of regular sound-waves and an irregular disturbance of the air. All the vowels are musical notes; to be more accurate, they are blends of many musical notes—the principal one and its over-tones. Now, *i* and *o* are just as much musical notes as *a* or *ah*; but if, instead of saying *ah*, we say *ark*, we are using a consonant, and it takes very little time to prove that we are now making a sound which is not a musical note at all, but a noise. There are many proofs of this.

For instance, the ear tells us the difference in pleasantness between a language full of harsh consonants, such as German, and a "liquid" language, as we say, like Italian, where two consonants of different kinds are scarcely ever allowed to be next to each other, and where the most is made of the vowels. In general, the higher the proportion of vowels to consonants in a language, the more musical we call it.

SOME SOUNDS THAT NOBODY IS ABLE TO SING

Again, we know that it is possible to sing a vowel, and though we may sustain the note for many seconds, we are all the time quite certainly producing the sound of that particular vowel—if we sing properly. But no one can sing a consonant, because every consonant is really an interruption, and nothing else, to the musical tone produced by the larynx. We seem to sing the letter *m*, it is true; but, in fact, when we listen to ourselves, we find that, after the first instant, we are simply singing through our nose a note which is neither *m* nor anything else. This fact of

the nature of consonants, as compared with vowels, is very important, both for the singer and the speaker, but in quite different ways, and everyone who speaks or sings know the difference.

WHY A SINGER LIKES TO SING IN ITALIAN

The first business of the singer is to sing—that is to say, to make music. But the singer is, as a rule, asked to sing words, though sometimes he may be allowed to sing for a little while a mere vowel like *ah*; and words are made up of vowels and consonants—that is, of sounds which are themselves musical, and sounds which are the very opposite of musical; some very unmusical, like *s*, and some less so, like *l*.

Thus, for choice, the singer will use a language, such as Italian, where the proportion of vowels to consonants is high, and when the consonants *do* come in, which, of course, they must if what he says is to be understood, he makes a point of dealing with them very quickly. Let them be definitely uttered, so that the people may hear what is being sung; but let this be done very quickly, because they are noises interrupting the music—every one of them. When we begin to learn to sing, we are all liable to try to sing on the consonants, and the first thing we have to learn is to do the singing on the vowels, which alone can really be sung. It is interesting to note, by the way, that the air-waves made in singing, and even in speaking, will throw scattered powder into patterns, and on page 4072 are some pictures drawn by the human voice.

THE GREAT IMPORTANCE TO A SPEAKER OF PRONOUNCING HIS CONSONANTS WELL

To return to speaking, the first business of a speaker, as contrasted with a singer, is to be understood, and when we come to study the words of any language, we find that the differences between them are due more to consonants than to vowels. The rule for the speaker, therefore, is exactly the opposite of the rule for the singer. Whatever happens, he must make no mistake about his consonants. He must not drop his voice at the ends of sentences or at the ends of words. It may be just at the end of the word that the consonant comes which tells people what the word really is. The fortunate and rare speaker is he who manages to get his consonants clearly enough sounded so as to be understood, and yet is not compelled to sacrifice all the music of his vowels. Such a speaker is a delight to listen to, for he satisfies both needs of his audience—the need of pleasant sound and of understanding without effort.

We do not need to study the consonants very long before we find, either by noticing what happens in ourselves or by looking at other people, that they can be classed. Certain parts of the organs of speech are specially used in making one set of consonants, and other parts in making other sets. For instance, we notice that we make *p*, *b*, and *m* with our lips, and so they are called the *labial* consonants, after the Latin word for lip. The first two we make by a little explosion of the lips, the difference between them being due not to the violence of the explosion, but to the quickness of it.

THE USE OF THE TONGUE AND THE TEETH IN PRONOUNCING OUR WORDS

Then we notice that the tongue is mainly used in the making of such vowels as *l* and *r*. There is certainly no doubt about the *r* if we roll it. Then there are certain consonants where there is no doubt that we use the teeth, as, for instance, *d* and *t*, and these are called dentals; and there are others, such as the sound *ng*, in which we evidently use the soft palate—that is, the back part of the roof of the mouth. So we call that a palatal consonant.

The larynx has nothing to do with the consonants, for, as we have seen, its business is to produce musical tones. We have also seen that the quality of sound produced decides the vowel, and that this is decided by the position of the tongue, the lips, and so on. It follows that if we allow air to pass up between the vocal cords, but without using them, we can still produce all the vowels and consonants; in other words, we can whisper, and that is what whispering is.

Thus, just as there are defects in speech due to defects in the machine, as, for instance, loss of the teeth, so also there are defects due to what controls the machine, and the chief of these is what we call stammering.

The next part of this is on page 4213.

THE LIFE OF THE EARTH

CONTINUED FROM 3999

"I AM old," said the Earth; "and yet, as things go——"

"So you are," said the Wind; "old and stupid."

"Why stupid?"

"Well, you know, as well as I do, that if it wasn't for Man you'd be nothing better than a savage. Look at your jungle; that's a nice kind of place, that is! And your desert—who would want to sit there on a hot afternoon? My dear, stupid old friend, you could no more grow a French rose, a dish of green peas, or a loaf of bread without Man than you could walk away from the sun and make a solar system for yourself."

"What you say is quite true," replied the Earth, "but very stupid."

"That's your way of putting it," laughed the Wind.

"To begin with," continued the Earth, "Man could not exist if it were not for me. That's an awkward point for you to get over at the outset. You see, you speak without thinking. But there's something else. Who wants French roses, green peas, and bread? Not I! I was perfectly happy, I can assure you, with dog-roses, wild peas, and wild corn. Man grows these things for himself. They make no difference to me, one way or the other. A garden or a jungle is just the same to me. And, finally, you don't seem to have thought that there is one thing I do produce by myself, which explains everything that Man does with his spade and plough, his trowel and hammer, his pen and paint-brush. I produce gold!"

"So you do; and the love of money is the root of all evil."

"Now, let us be sensible," said the Earth, "and see the question in a true light. I am ready to admit that cornfields and gardens and palaces are very pleasant little things, and that without Man I could not have produced them for myself, even if I had wanted to do so.

"But, my friend, is it not equally true that Man is a part of me? He is as much me as the soil that he digs, the trees that grow out of that soil, and the birds that build their nests in those trees. I am his mother, and what Man does may be said to be my work. I consider that French roses, green peas, and bread and butter are productions of my own. Certainly, they could not exist if it were not for me; even as Man could not exist except on my breast. Moreover——"

"You are becoming dry," said the Wind. "Try to be a little more interesting."

Just at that moment Man came by, with a spade under his arm, a fleece over his shoulder, and a flower in his hat.

He paused by a brook, and, kneeling down, drank of the crystal water.

"There," said the Earth proudly, "what would Man do if it were not for water? Have you thought that the Milan Cathedral, Windsor Forest, Turner's pictures, railway engines, motor-cars, and electric light could not have come into existence without water? Water, my friend, is a greater worker than Man. And I create it. It is mine. Man has done nothing to create this magician. Nothing!"

THE WATER THAT MAN USES TO TURN HIS WHEELS

"Well," said the Wind, "he makes a better use of it than you do. His canals are more sensible than your waterfalls and rapids. He makes water turn his wheels; and that's something —*a wheel*. A wheel is something you could never grow if you sat up all night for a thousand years."

"No wheel could exist," said the Earth, "without water."

Man raised his face from the brook. "Thanks to thee, O Sun, for that draught of water!" he exclaimed, with a smile.

The Wind burst out laughing.

"Man!" said the Earth, "are there no thanks for me?"

"Ay, a multitude," replied Man. "Every breath that I draw is a benediction on thy beauty, and thy power, and thy wealth. Thou art my mother, and everything of mine is thine. But the Sun is my father, and between thee and him is my love shared. Thanks to thee, O Sun, and thanks to thee, O Earth, for this draught of cold water."

"Look here," said the Wind testily; "don't you see that your father would roast you alive, and your mother would leave you to starve, if you trusted yourself to their love? They care about as much for you as I care for a sinking ship in a tempest."

THE JOY OF MAN IN RESTING AFTER HIS WORK IS DONE

"And don't *you* see," cried Man, "that if the Earth mothered me, and the Sun fathered me, I should be soft as river-mud, and unstable as sea-sand? It is because they love me that they make me work. I thank them as much for that necessity as for the materials they provide me with for toil. When my work is done, I love to stand under the heavens, or rest upon a rock, or lie on the green grass of a river-bank, and think of all my fathers learned, and dream of all my children yet shall do."

"You see," said the Earth, speaking to the Wind, "Man realises better than you the truth of this matter. He perceives that I provide everything. He tills the soil, but the soil makes the gift. All over the world he is ploughing the ground, breaking the great clods, rolling the fields; all over the world he is sinking his shafts into the darkness of my mystery, and groping his way into my caverns; all over the world he is building, planting, seeking; but everywhere it is I who give him the gifts. There is nothing which does not come from Earth."

"There is an ancient saying," quoth Man, "which is good for us to keep in mind. My fathers fashioned it in days long ago, when life was young and the eyes clear, and it has the truth of this matter. This is the saying: Man plants, Man waters, but God giveth the increase."

THE GREAT MYSTERY OF LIFE AND THE POWER OF REASON

"You are talking of mystery," said the Wind.

"All is mystery," answered Man, shouldering his fleece, lifting his spade, and looking up to the heavens. "The caterpillar dies before our eyes, and before our eyes emerges winged and beautiful. Who shall say that the chrysalis had power of itself to put on the raiment of the air—out of death's husk to weave the wings of flight? Who shall say that the grain I lay in the earth has power of itself to thrust from darkness into the light, and multiply a hundredfold? Behold, the Earth, which produces all things that I know, *moves*.

"Does it move of itself? The sun and the stars *move*. Do they move of themselves?

"Who shall tell me how, in the beginning of things, came motion? What is the thing we call Motion? Mystery—all is mystery! Wherefore, while I bless my father, the Sun, and my mother, the Earth, and while I see that all I have, and all that my children can possess, comes from the Earth, yet do I bow myself before the Creator of heaven and earth, the All-Father, and wait His word. I have within me one thing that my mother, the Earth, did not give—I have Reason. It belongs to God."

The next Familiar Things are on page 4159

PREPARING FOR THE YEAR'S HARVEST

In the United States are grown every year nearly 2,000,000,000 bushels of wheat, barley, and oats, some of which is sent abroad to help feed the nations of Europe. The first step in obtaining this great harvest is to prepare the ground, and here we see manure being scattered evenly over a large field by means of a machine.

The old-fashioned method is to toss it about with a fork, as we see the man doing in this picture. But the machine does the work better and more quickly. Manuring is really feeding the soil, and although science has taught us to make manure from chemicals, the best food for the ground is the litter from farmyards and stables.

PLOUGHING WITH HORSES AND MOTOR

Soon after the harvest is gathered in, the farmer begins to plough his land for the next, and sights like this are familiar. The plough is guided in a straight line by the man who holds the handles, and the ploughshare, or twisted blade, cuts a furrow, or trench, and turns the soil over, so that the air, and sun, and rain, can act upon it.

On large farms more up-to-date methods are adopted, and a whole row of furrows can be ploughed at one time. This is done by using large ploughs fitted with several ploughshares, and in the picture we see two ploughs drawn by a motor-engine and guided by only two men. Eight furrows are here being cut at the same time.

THE OLD STYLE OF SOWING THE SEED

After the land is ploughed, and has been left to the action of the weather for a time, the clods of earth have to be broken up, the soil loosened, and the weeds that have grown destroyed. This is done by a machine called a cultivator, which has a number of steel prongs that tear through the ground, and do the work very quickly.

When the ground is quite ready, the seed is sown, and on many farms this is done by hand, just as it was in Bible times when the parable of the Sower was told. In our picture we see a man carrying the seed and casting it right and left as he walks up the field. Of course, much of the seed is wasted when sown by hand.

THE NEW STYLE OF SOWING THE SEED

On larger farms the sowing is done by machinery, and here we see a machine for drilling and sowing seed being filled with barley ready for sowing a large field. The seed is put into the ground from two to five inches deep by means of tubes known as shoes, which first of all drill holes for the grain, and this method saves waste.

It was a long time before seed-sowing machines of this kind could be driven easily and smoothly over the ground as it is being done here. The tubes that placed the seed in the soil used to catch in obstacles and stop the machine. But when the tubes were made like shoes, they were able to cut through or rise over obstacles.

FAIR WAVES THE GOLDEN CORN

Here we see a field of ripe wheat ready to be cut, the result of man's labour combined with the sun and rain. There are few finer sights in Nature than the golden grain rippling and waving as the wind passes over it.

The ripe wheat used to be cut by hand with a sickle; but now a wonderful machine, called a self-binder, is used, which not only cuts it, but binds the wheat into sheaves as the machine moves along. In this picture two self-binders are seen at work in a very large field that would take many days to reap by the old method.

CARTING AND STACKING THE WHEAT

So rapidly do they reap a field that two machines, working as shown in the bottom picture on page 1085, can cut twenty acres of wheat in a day, and leave it as we see it here, quite ready for carting to the stackyard or barn.

Here the wheat that has been cut is being carted and stacked. In some ways this is the crown of the farmer's labours, for once the good ripe grain is cut, and stacked, and covered or thatched, no harm can come to it from the weather, however rainy it may be. In different parts of the country the stacks are built into different shapes.

THE WHEAT THRESHED AND SOLD

After being stacked, the wheat is quite ready for threshing. The threshing machine, which is shown in our picture, is such a large and expensive machine that farmers do not buy it, but hire one to do their work. The wheat is put into the machine just as it was gathered, and the grain is separated from the chaff and straw

The grain is then taken to a dry granary, where it is stored until sold. If it is to remain there long, it has to be turned with a shovel from time to time to keep it dry and sweet. Samples are shown to likely buyers, and when a purchaser is found, the wheat is put into sacks and carted in vans to the mill or warehouse of its new owner.

CUTTING THE HAY FOR THE CATTLE

The hay harvest is an important part of the farmer's work. Hay is produced from the grass and mixed herbage of the meadow, and is used as food for horses, cattle, and sheep. It used always to be cut by hand with a scythe and drawn together for carting with a rake, but workers such as these are not often seen on farms to-day.

A machine like the one in the picture is called a mower, and it can cut an acre of grass for hay in a single hour. It does not do the work as well as men using scythes, but it is so much quicker and cheaper than hand labour that nearly every farmer now uses a machine in his hayfields. Some machines cut a row ten feet wide.

THE HAYMAKING AS IT REALLY IS

Poets, and other authors, who write about the country, speak of haymaking almost as though it were a nice game in which men and women are laughing all the time. But it is hard work. A great horse-rake goes quickly over the field, pulling the hay into rows, and then men with forks make it into heaps ready for carting.

Before carting, the hay is left in the field for some time, so that the sun may dry it properly. It is turned over two or three times, and in this way all parts get the warmth and light. Then the cart comes, and with two or three men working together, some throwing the hay up and others receiving it, the field is soon cleared.

PUTTING THE LAST LOAD ON THE STACK

There is no more delightful sight in all the countryside than a scene such as this, where the last load of hay is being put upon the stack, and the harvest is about to be completed. Such typical farming scenes are, however, fast disappearing, for even the unloading of the cart and the building of the stack are now done by machinery.

THE NEXT FAMILIAR THINGS ARE ON PAGE 4159

WHAT THIS ARTICLE TELLS US

ONE of the purposes of our book is to help boys and girls to understand what they read in newspapers or magazines. Every day something is printed about "strikes," "lockouts" or "Labour Unions," and this often puzzles young people. This article tells what these words mean and much besides. No matter what we think about the different organisations of working men, we must know why they have been formed and what they do if we are to be intelligent citizens. We find that Canada has a better plan of dealing with some of the disputes between employers and their men than most other countries have.

CANADIAN LABOUR UNIONS

As you may not know the objects of Trade Unions I shall try to tell you before saying anything about Canadian Trade Unions in particular. Most people who are members of Trade Unions belong to the so-called working classes, and by this is meant that they work with their hands. These people are generally not very well off, and, as a rule, have saved little or no money. On the other hand, their employers are generally men of means. The result is that a working man is at a disadvantage in making a bargain to work for an employer.

The employers do not care much whether a particular person works for them or not, but it may be a matter of food, clothes and shelter for the working man. It may happen, therefore, that a man will make a very bad bargain with the employer rather than go without work. Then, too, it may be very hard for the working man to be dismissed at any time, and for any reason. The employer can get along for a time even if no work is done in his factory, but the men and their families may suffer very much under such conditions.

"In union there is strength" is an old proverb. By adding a letter to one word we have: "In Unions there is strength." The men, especially those in the skilled trades, group themselves in Unions, and make bargains with the employers as Unions. By so doing they increase their power very much and make better bargains. They pay dues to the Unions, partly to meet expenses and partly to provide a fund from which they may draw when they are out of work or ill.

THE TRADE UNION

A Trade Union is composed of a number of men, all of whom work at the same trade. For instance, we have the Brick Layers' and Masons' Union in a particular place. If the place is a large one, there may be several Brick Layers' and Masons' Unions, and all of them may meet at times under the name of a District Council. There are 1740 Trade Unions in Canada, having 133,000 members. There are very few District Councils, for it is not usual to have them. You will see accounts of Trade Unions in the newspapers almost every day.

THE TRADE AND LABOUR COUNCIL

Each of the Trade Unions in the large cities of Canada sends a delegate or several delegates to the Trade and Labour Council of that city. In Montreal, for instance, the Trade and Labour Council is made up of men from the different Unions in the city, and so you will find in the Council men of many different occupations. In the Council meetings, which are frequently held, matters of interest to the working people of the particular city are discussed. In Canada there are 40 Trade and Labour Councils.

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CANADIAN AND AMERICAN UNIONS

Most members of the Canadian Unions are on friendly terms with the members of American Unions. In fact, Canadians and Americans often belong to the same body, which may have members all over North America. This is true of the Brotherhood of Locomotive Engineers, a very powerful and respected order, about which I shall have something more to say later.

On the other hand, some Canadian Unions will have nothing to do with the Americans. Some think that this is a great mistake, because large bodies of men are nearly always more powerful than smaller bodies are, but other people think that it is a mistake for the people of the two countries to combine. The employers are generally opposed to the combined American and Canadian orders, because it gives the men greater strength in bargaining. Of the 133,000 members of Canadian Unions, 119,000 are in favour of close relations with the American Unions.

THE DOMINION TRADE AND LABOUR CONGRESS

This is the name of a body of men made up of delegates from most of the Unions or Councils which have friendly relations with American Unions. It meets every year in a centrally situated city, and the delegates come from all parts of Canada. There are some orders which are friendly to the American Unions, but do not send delegates to the Trade and Labour Congress, and the most important of these orders are the Railway Brotherhoods. The Trade Unions connected with the Trade and Labour Congress have a membership of nearly 60,000.

THE CANADIAN FEDERATION OF LABOUR

The Canadian Federation of Labour is very much like the Dominion Trade and Labour Congress, in being composed of delegates from different parts of Canada, but it is not friendly to a system of close connection with the American Unions, and, as a matter of fact, has nothing to do with them. This policy is the only reason for the existence of the Canadian Federation of Labour. It meets once a year like its rival, but it is not so powerful, as its membership is quite small. The members of the Trade Unions connected with it number about 10,000.

OTHER CANADIAN NATIONAL BODIES

There are ten other national bodies in Canada, but they are very much smaller than the two which I have told you about, and there is nothing of importance to be said about them.

THE RAILWAY BROTHERHOODS

The Canadian Brotherhoods of Railwaymen are all connected with similar Brotherhoods in the United States, with whom they are on the best of terms. Most of them do not send delegates to the Dominion Trade and Labour Congress, but this is not because they are not friendly to the Congress. On the contrary, they are on very good terms with it. But the Brotherhoods have a good deal of money, are very powerful and prefer to stand alone.

They are well able to fight their own battles, as they are composed of very intelligent and competent men, and do not care to be mixed up in the squabbles of others. You may be interested in the names of some of these Brotherhoods, and I shall give them to you. They are the Order of Railway Conductors, the Brotherhood of Locomotive Engineers, the Brotherhood of Firemen and Enginemen, and the Brotherhood of Railroad Trainmen. There are other orders among railwaymen, and some of them send delegates to the Trade and Labour Congress, while one or two are represented in the Federation of Labour, but none of them is so important as those I have named.

STRIKES AND LOCK-OUTS

When the members of a Union have a quarrel with their employer, and cannot come to an agreement with him, their strongest weapon, and the last to be used, is the "strike." When a strike is ordered, the men cease to work in a body, and try to prevent others from working for their old employer. On the other hand, the employer, who cannot agree with his men, may dismiss them, or a large part of them, and this is called a "lock-out." Now we all know that

strikes are not pleasant, but they are about the only means by which Unions can enforce their demands.

THE INDUSTRIAL DISPUTES INVESTIGATION ACT

In Canada, we have to a certain extent met this difficulty by making it hard for a strike or lock-out to take place in a few important industries called Public Utility Industries. These Public Utility Industries in Canada include steam and electric railways, telephones, telegraphs, two already chosen. This third man, who is generally a judge or lawyer, is the chairman. The members of the Board listen to both sides of the question, and give their decision, and not until this decision is given may a strike or lock-out be declared.

Neither the employers nor the men are compelled to accept the decision of the Board, but a strike or lock-out is seldom successful when the public are not in favour of it, and, as the public will generally agree with the members of the Board, the employers and men will act very foolishly if they do not accept its decision.

The act has been very successful. In most cases, a strike or lock-out has not been declared at all, but both sides have accepted the judgment of the Board, and even in those few instances where a strike or lock-out has followed, the final agreement has generally been precisely that which the Board had advised.

MOUNT WAPTA AND YOHO VALLEY FROM THE KICKING HORSE PASS

Photograph by Notman, Montreal.

The views of the mountains on both sides of the Kicking Horse Pass are wild and beautiful. Mount Wapta is 9,990 feet high and affords a stiff ascent for those who love mountain climbing, though it is not so dangerous as some others. The Yoho Valley has been made a national park in order that its beauty may be preserved. The Kicking Horse, or Hector, Pass was discovered in 1859 by Sir James Hector.

mines and a few others. When the men and their employers in these industries have a dispute, it is not legal to call a strike or order a lock-out until an investigation takes place. The Act of Parliament, which makes this necessary, is called the Industrial Disputes Investigation Act or the Lemieux Act.

The difficulty to be settled is referred to a Board of three men, one of whom is named by members of the Union, one by the employer and the third by the

This is the Grand Trunk Railway Bridge across Niagara River below the Falls. It carries two tracks for trains, and below are roadways for vehicles and for passengers. The bridge is 1,100 feet long and is 226 feet above the water. Notice the electric railway line along the side of the river.

Pictures by courtesy of the Grand Trunk Railway.

We have shown several views of Winnipeg, but this picture of Portage Avenue, with its great shops and office buildings, will emphasize still more the wonderful growth of the city which has sprung up in the prairie as if by magic. It is difficult to realise that in 1870 there were only 240 inhabitants in the little village. With the coming of the railroads, population increased rapidly.

When logs reach the river, they are turned loose to float down. Where the river is narrow or full of projecting rocks, the logs sometimes "jam," that is form a sort of dam and it is both difficult and dangerous to start them again. These logs have floated to safety and lie in the smooth water of the Ottawa River. They are kept together by other logs chained together forming "booms," and can be used as needed.

Photographs by Notman, Montreal.

Here is the Rideau Canal at the point where it joins the Ottawa River. Notice the locks by which the boats are raised to the higher level, or descend from it. The Library of Parliament and the rear of the Parliament Buildings are shown on the bluff at the right. By means of the Rideau Canal, River and Lakes navigation is open between Ottawa and Kingston, and thence of course into Lake Ontario.

LITTLE PICTURE-STORIES IN FRENCH

First line: French. Second line: English words. Third line: As we say it in English.

Ceci est l'histoire d'un arbre de Noël, et d'un garçon qui s'appelle Henri.
This is the history of a tree of Christmas, and of a boy who himself calls Henry.
This is the story of a Christmas-tree and a boy named Henry.

Il avait beaucoup neigé et la terre était toute blanche de neige.
It had much snowed, and the earth was all white of snow.
It had been snowing hard, and the ground was white with snow.

Henri et ses amis firent des boules de neige. Ils eurent une bataille.
Henry and his friends made some balls of snow. They had a battle.
Henry and his friends made snowballs. They had a battle.

Dans la salle d'école il y avait un arbre de Noël, décoré de cadeaux.
In the room of school it there had a tree of Christmas, decorated of presents.
In the schoolroom there was a Christmas-tree hung with presents.

L'après-midi les enfants firent un homme de neige dans le jardin.
The after midday the children made a man of snow in the garden.
In the afternoon the children made a snow man in the garden.

"Je ferai un homme de neige pour l'arbre," pensa Henri en lui-même.
"I will make a man of snow for the tree," thought Henry in him-self.
"I will make a snow man for the tree," thought Henry to himself.

Il fit le corps, les bras, les jambes et mit une pipe dans la bouche.
He made the body, the arms, the legs, and put a pipe in the mouth.
He made the body, the arms, and the legs, and put a pipe in his mouth.

Il plaça l'effigie sur le couvercle d'une boîte et pendit la boîte à l'arbre.
He placed the effigy upon the lid of a box and hung the box to the tree.
He put the figure on the lid of a box and hung it on the tree.

Le matin il courut à l'arbre et que pensez-vous qu'il trouva ?
The morning he ran to the tree, and what think you that he found ?
In the morning he ran to the tree, and what do you think he found ?

Une petite mare d'eau. Naturellement la glace avait fondu pendant la nuit !
A little pool of water. Naturally the ice had melted during the night !
A little drop of water. Of course the ice had melted in the night !

FAMOUS MODERN THINKERS

ROUSSEAU. BENTHAM. MAZZINI. BURKE. ADAM SMITH. MILL. CARLYLE. EMERSON. RUSKIN.

CONTINUED FROM 4062

ON one occasion when Boswell had returned from abroad, Dr. Johnson said to him in a sarcastic tone: "It seems, sir, you have kept very good company abroad, Rousseau and Wilkes!"

"My dear sir," answered Boswell, "you don't call Rousseau bad company. Do you really think him a bad man?" Johnson replied: "Sir, if you are talking jestingly of this, I don't talk with you. If you mean to be serious, I think him one of the worst of men, a rascal who ought to be hurled out of society, as he has been. Three or four nations have expelled him, and it is a shame that he is protected in this country."

That is one view. Lord Morley gives another: "It was Rousseau who first in our modern time sounded a new trumpet-note for one more of the great battles of humanity. He makes the poor very proud, it was truly said. . . . It was in Rousseau that polite Europe first hearkened to strange voices and faint reverberations from out of the vague and cavernous shadow in which the common people move. . . . The race owes something to one who helped to state the problem, writing up in letters of flame at the brutal feasts of kings and the rich that civilisation is as yet only a mockery, and did furthermore inspire a generation of men and women with the stern resolve that they would rather perish than live on in a world where such things can be."

A writer has described a visit to this Jean Jacques Rousseau on the fourth floor of a house in Paris: "We passed through a very small antechamber, where the household utensils were neatly arranged, and from that into a room where Jean Jacques was seated in an overcoat and a white cap, busy copying out music.

"He rose with a smiling face, offered us chairs, and resumed his work, at the same time taking a part in conversation. . . . Near him was a spinet, on which from time to time he tried an air. Two little beds of blue and white striped calico, a table, and a few chairs, made the stock of his furniture. . . . His wife was sitting mending linen; a canary sang in a cage hung from the ceiling; sparrows came for crumbs on to the sills of the windows which on the side of the street were open; while in the window of the antechamber we noticed boxes and pots filled with such plants as it pleases Nature to sow. There was in the

whole effect of this little establishment an air of cleanness, peace, and simplicity which was delightful."

Two swallows built their nest in Rousseau's bedroom, and there hatched out their brood.

"I was no more than a door-keeper for them," he said, "for I kept opening the window for them every moment."

They used to keep on flying round about his head with a great stir until he had fulfilled this humble duty.

ROUSSEAU, THE STRANGE, BAD MAN WHO WAS GOOD TO THE POOR

Now, you will think that Dr. Johnson exaggerated when he said that Rousseau ought to be transported. But the truth is that Rousseau is one of those strange men about whom it is possible to hold two opinions, and those the most contradictory. Lord Morley, in his great book on Rousseau, quoted a verse of Victor Hugo's, which likens the soul of a man to a pool; in the still water is mirrored the sky tinged with heaven's fire, and beneath is the loathsome slime, where black and shadowy reptiles creep dimly through the dark. Such was Rousseau's soul.

Rousseau was an angel of light to the poor. He saw a world where men suffered, women grew spiritless, and children went hungry, cold, and ignorant; and where those who sought to make things better got lost in a maze of words. To Rousseau it seemed that one thing only was necessary—*to simplify*.

He wanted to simplify religion, so that all men might share its comfort; to simplify social relations by making all men equal; to simplify manners by homeliness and thrift; and to simplify literature and art, and life in general, by what he described as "a return to Nature"—that is to say, by constantly referring ourselves to Nature itself instead of to society and books.

THE MAN WHO SOWED THE SEEDS OF THE FRENCH REVOLUTION

He was stung by pain and suffering as Dr. Johnson could never be. "Worn-out horses," he exclaimed, "ready to expire under the blows they receive; wretched peasants, attenuated by hunger, broken by weariness, clad in rags; hamlets all in ruins—these things offer a mournful spectacle to the eye; one is almost sorry to be a man, as we think of the unhappy creatures on whose blood we have to feed." But if Rousseau felt these things more keenly than Dr. Johnson, he did not possess that great man's solid and lasting common-sense. Dr. Johnson was a good man. Rousseau was a bad one. To tell Rousseau's story, even in brief, would be to shock and disgust us. It is enough to know that the later years of his life were spent in some form of madness, the seeds of which were probably growing all through his youth and manhood.

We cannot explain these things. The great and virtuous Dr. Johnson never altered one cruel, wicked, or tyrannous injustice. The mad Rousseau made the poor very proud. It was from Rousseau that the great movement sprang in France which altered the whole system of government. We may say that he sowed the seeds of the French Revolution, and gave to all other nations fresh ideas and grander ambitions.

THE GREAT WATCHWORD THAT JEREMY BENTHAM GAVE THE PEOPLE

He who invents a great phrase does more than preach a sermon, for a phrase that sticks in the mind is like a lever thrust under the thoughts of men in order to turn them into a fresh channel. The older we grow the more we shall see how mighty a thing it is to change men's opinions. Every man clings to his own ideas. Outside the radius of his own light all is darkness. And this darkness is not illuminated by long books and speeches glowing with fine words. It yields before the flash of a pithy sentence.

To Jeremy Bentham belongs the honour of turning men's minds in a new direction; and this he did by a single phrase. While but a few pored over his long books, the soul of Europe seized upon one single sentence therein and flashed it like a torch into the darkness that surrounded them.

This phrase was not strictly his own, but he it was who made it live. It runs simply enough: "The greatest happiness of the greatest number." Bentham wanted to find a reason for things—a reason for morality and a reason for law; he discovered it in this simple phrase. The object of morality and the object of law is the greatest happiness of the greatest number.

Before his day men thought loosely about such subjects. Law was to punish crime. Morality was what the priest ordained. Bentham revealed deeper foundations. Law did not exist to protect the rich man's purse from the thief, but to secure the freedom and happiness of all men. Morality was not born out of the clouds; it was man's own discovery for the blessing and advance of the human race. All the efforts of government justified themselves only if they aimed to secure the greatest happiness of the greatest number.

A party of famous men at the house of Sir Joshua Reynolds, the first president of the Royal Academy. Reading from the left hand the names are James Boswell, Dr. Johnson, Sir Joshua Reynolds, David Garrick, Edmund Burke, Charles Burney, Paoli, the Corsican patriot, Thomas Warton, and Oliver Goldsmith.

Does not this seem simple to us, and striking? Even now happiness is regarded by many people as the exclusive property of the few.

But before Bentham's day the masses of people in the world were almost resigned to the idea that only the rich could be happy, and that it was to protect the rich that there were laws and morality. Jeremy Bentham developed the splendid thought of Bacon that philosophy must be the servant of humanity. He invented the word *utilitarian* to describe the only philosophy that was worth while, a philosophy that was useful to the human race. He did not believe in dreaming of ideas. He wanted philosophers to show the human race—the greatest number of the human race—how to be happy.

There are faults in the details of Bentham's theory. Some object to its main idea. We should have to agree first in what happiness consists before we could march forward. And we should have to remind ourselves of Bacon's noble saying, "Prosperity doth best discover vice, but adversity doth best discover virtue," before we could be certain of our goal. Nevertheless, our debt to Bentham is a great one, for he established both law and morality on a sure foundation at a time when men, ill-educated and made hasty and reckless by suffering, were inclined to hurry all such things to the fire of destruction.

And Bentham also gave to men the Christlike principle that they should consider the happiness of other people before everything else. If every politician, preacher, writer, and private person truly sought the greatest happiness of the greatest number, we should be within sight of the Golden Age.

Bentham was the son of a rich man, and was born, very weakly of body, in Houndsditch, London, in 1748. He read history when he was three years of age, and at the same time began to learn Latin. At six he was playing the violin, and he matriculated at Oxford when he was only thirteen. He loved music to the end of his days, and kept a piano in every room of his house. He was fond of flowers, and had many shady walks in his London garden. He was modest, hospitable, and simple in his conversation. He died aged eighty-four. His body was dissected—as he had instructed—and, after being embalmed and dressed in his usual garments, it was set up in University College, London.

Room must be found in this brief chronicle of great thinkers for the noble-minded patriot of Italy, Joseph Mazzini. He was a man who loved Italy above everything else on this earth, and God above everything else in the universe.

JOSEPH MAZZINI, THE PATRIOT THINKER OF ITALY

He spent his life in exile, was imprisoned, was banished from country after country, and for many years lay under sentence of death. But his faith never wavered. At the dawn of his manhood he founded a society called Young Italy, which was to work for the freedom of the country, then oppressed by foreign tyranny and torn by quarrels within itself. The motto of this society was "God and the People"; on its banner were the words "Unity," "Independence," "Liberty," "Equality," and "Humanity." From these ideals he never swerved.

His call came to him as he lay in prison. Looking out from his cell, he could see the sky and the sea. "Symbols of the Infinite" he called them. His only companion was a greenfinch; his only books were "a Tacitus, a Byron, and a Bible." In these circumstances it was that the call came to him, "God and the People."

The great work which he did as a patriot of Italy belongs to the world. His patriotism ennobled humanity. Every nation has been the better for his life. Mazzini was one of those great souls who recognise God in politics. He did not seek to make the Italians free only that they might earn more wages and work fewer hours; he preached to them a lofty gospel of duty to God and man; he set virtue always before their eyes. The mere political agitator, who sets class against class, would have felt the lash of Mazzini, who loved the common people because he always believed them to be the children of God.

EDMUND BURKE, WHO MADE MEN SEE THE PRINCIPLES THAT MOVED THEM

If we heard someone praising Edmund Burke, and asked what it was he did to deserve praise, the admirer of Burke would not be able to point to any definite achievement. He would not be able to say that Burke conquered this or that country, nor that Burke tore down a tyrant from a throne, nor that he wrote a book which has been the comfort and consolation of unhappy men. And yet the name of Edmund Burke remains one of the very greatest in the history of the world. He was only a voice, but a voice of power.

It has been finely said of him that he made great tides in human destiny very luminous. This meant that he could make men see the current of principle which carried them forward, make them aware of the reasons which moved them. The work of the great thinker is that of the interpreter. He interprets into human language the deep and obscure feelings of the soul. We know that we are often carried away by feelings, that we are often driven to do things without knowing why; it is the same with all men and women, and with nations. We are all conscious of being swept into certain actions, or of being intensely occupied by certain notions and ideas; but we cannot explain in simple language what it is that moves us.

HOW BURKE STOOD FOR FREEDOM AND HONOUR AMONG THE BRITISH PEOPLE

Burke was one of the great interpreters of justice, freedom, and morality. The work of which he was proudest was the spirit of justice, freedom, and morality which he breathed into our rule of India. He attacked before the whole world one of his own countrymen, Warren Hastings, for misconduct in India. This impeachment in itself was a small matter; the glorious result of it was that the whole of England realised its responsibilities in India for the first time. Burke made Englishmen feel the glory of freedom, the honour of justice,

BURKE SPEAKING AND EMERSON WRITING

Edmund Burke was one of the greatest political thinkers. He believed in steady progress, but never ceased to denounce the French Revolution. The famous dagger scene in Parliament has become historic. Declaring that daggers were being made at Birmingham, he hurled one upon the floor of the House of Commons, exclaiming: "That is what you are to gain by an alliance with France." He was much laughed at for this action.

Ralph Waldo Emerson, our American poet and essayist, was one of the most original thinkers of the nineteenth century. He taught that the soul of man is the master of the intellect and the will, and by its illuminative mass can interpret the mysteries of Nature. A man of sweet and gentle character, he lived simply and quietly, and here we see him in his study at Concord, which was not only the study of a scholar, but the bower of a poet.

and the eternal necessity for morality. Ever since his day England has endeavoured to govern her vast empire, not as something to make her rich, but as something for which she is responsible to God and humanity.

THE ENGLISHMAN WHOSE VOICE MOVED ALL EUROPE

Burke stood for the honour of the English nation when George III. would have taken away their privileges, and made himself an autocrat. Burke was on the side of France in the Revolution, till the justice of that movement clad itself in the murderer's dress and built its walls of freedom in the blood and agony of despotism. He was ever on the side of justice and freedom, but it was as a man conscious of righteousness.

Although he practically swayed Europe with his voice, he had no place of power in England. When Windham received one of his greatest books, he wrote in his diary : " What shall be said of the state of things, when it is remembered that the writer is a man decried, persecuted, and proscribed ; not being much valued even by his own party, and by half the nation considered as little better than an ingenious madman ? " Oliver Goldsmith made a mocking epitaph upon him :

Here lies our good Edmund, whose genius was such,
We scarcely can praise it or blame it too much ;
Who, born for the universe, narrowed his mind,
And to party gave up what was meant for mankind.

Dr. Johnson said that you could not meet Burke for half an hour under a shed without saying that he was an extraordinary man. It is curious to relate that, at the end of his days, the king was going to make him a peer, with the title of Lord Beaconsfield. Before this happened Burke lost his only son, who was a foolish fellow. But this son was loved passionately by his father, who sank under the loss.

THE STORM OF SORROW THAT BOWED DOWN A STRONG MAN

" The storm has gone over me," he wrote, " and I lie like one of those old oaks which the late hurricane has scattered about me. I am stripped of all my honours ; I am torn up by the roots and lie prostrate on the earth. I am alone. I greatly deceive myself, if in this hard season I would give a peck of refuse of wheat for all that is called fame and honour in the world."

One of his wisest sayings about government was : " The question with me is not whether you have a right to render your people miserable, but whether it is not your interest to make them happy."

This wonderful man was born in Ireland, and made his way in the world with no interest of any kind. His father refused to help him because he would not follow the law as a profession. By his own splendid powers, his devotion to work, and his faith in the justice of his cause, he rose to be the inspiration of political Europe.

ADAM SMITH, THE SIMPLE MAN WHOSE BOOK GAVE MEN NEW IDEAS

Adam Smith, a great writer on political problems, was a Scotsman, and as a child was stolen from his mother's door by travelling tinkers. His book, called " The Wealth of Nations," altered the ideas of men both in England and abroad. He was devoted to the working class, and was suspicious of tradesmen, merchants, and manufacturers.

" It is but equity," he says, " that those who feed, clothe, and lodge the whole body of the people should have such a share of the produce of their own labour as to be themselves tolerably well fed, clothed, and lodged." Also : " Our merchants and manufacturers complain much of the effect of high wages in raising the price, and thereby lessening the sale, of their goods both at home and abroad ; they say nothing concerning the bad effects of high profits ; they are silent with respect to the pernicious effects of their own gains ; they complain only of those of other people."

This great and good man received honours on every hand, and followed his simple, modest, and useful habits to the end of his life, in 1790. He was a friend of Hume, the historian, and was known to the first minds in France. He became Lord Rector of Glasgow University.

John Stuart Mill was a man whose life will always remain one of the most interesting in human chronicles. His father, the son of a Scottish shoemaker, had raised himself by sheer force of literary industry to a position of importance in London. He had original

HOW JOHN RUSKIN TAUGHT HIS STUDENTS

John Ruskin was a daring and original teacher of art, but he was also a bold thinker on the problems of modern life; and although his views were at first laughed at, it is now generally recognised that much of his teaching was right. While a professor at Oxford, Mr. Ruskin took his students out to break stones and make up the roads, in order to impress upon them the dignity of labour and to improve the appearance of the country.

notions about things, and did not believe in schools. He educated his young son himself, and at three years of age John was learning the Greek language. The boy grew up in the companionship of this earnest father, and early in youth manifested singular powers.

THE SUDDEN THOUGHT THAT CAME TO JOHN STUART MILL

He was a man before he was a boy, and could hardly remember the time when he did not think. He received his "call" from reading a French translation of a work by Bentham. He set himself with enthusiasm to see the way which led to the greatest happiness of the greatest number. He wanted to make life happier and nobler, and he saw that the way out of misery could only be found by resolute thinking.

While he was striving with great enthusiasm for this grand object, a sudden chill struck through his soul. His soul asked the question: Suppose that all your objects in life were realised, that all the changes in institutions and opinions which you are now looking forward to could be completely effected at this very instant, would this be a great joy and happiness to you? He saw that his happiness lay in working for the grand end, not in the end itself. "I seemed," he said, "to have nothing left to live for."

So it must be with all philosophers and politicians who do not see that progress is infinite and eternal; that there cannot be any *end* at all, because man is immortal.

Mill found his work in seeking how to guard democracy from self-destruction. Many people thought that if workmen were given a vote the empire would fall to pieces, religion would be trampled underfoot, and the race of Englishmen would perish in sin. Mill did not think the danger was so great; but he certainly felt that something should be done to teach workmen, and, indeed, all kinds and conditions of men, that life was a serious and delicate experiment.

THE PLAIN PHILOSOPHER WHO MADE THE MULTITUDE THINK

The shouter at a street corner often knows nothing of history; he cares little what he says; he handles life as if it were a box of bricks. Mill saw that all men accepted the ruling of great men in the matter of science, and he thought it should be possible to form a science of politics, the masters of which would tell democracy what was right and what was wrong in the ideas of politicians. He wanted certainty.

All his chief work was in this direction. He failed; but it was a failure which is better than many victories. There can never be certainty in opinions, and politics is largely a matter of opinions. Mill, however, has taught men to be careful how they think, and still more careful how they speak. He has shown us the danger of words, and made us steady workers for change, instead of violent, hot-headed revolutionists. More than this, he set people thinking who had never thought before, and to those who did think he brought more subjects for their thoughts, and fresh ideas for their illumination. He was one of those quiet and self-contained philosophers who effect great reformations by making the multitude think.

THOMAS CARLYLE, THE SCOTSMAN WHO ROARED AT THE WORLD

A very different man from Mill was his friend, Thomas Carlyle. Carlyle had no nervousness in his nature, no hesitancy about speaking. He opened his mouth and roared at the world. He was sure that what he had to say was the only thing worth saying, and, accordingly, he said it with energy.

Carlyle's gospel was the gospel of great men. The workman, armed with a vote and become master of the British Empire, was bid by this big-hearted Scotsman to study great men, to listen to the heroes, to bow before the divinities of the human race. While Mill was seeking, with laborious care, for certainty, Carlyle was shouting to the world that salvation lay in the worship of great men. He felt that he had read the riddle of the Sphinx.

There is much excellent truth in Carlyle. Huxley, the man of science, said that Carlyle's writings had saved him from becoming an idle and light-minded man, had made him earnest. But Carlyle rather overdid his gospel, for he was preaching energy to the most energetic nation on the face of the earth. He did not bring home to Englishmen their need for modesty, gentleness, refinement, spirituality. He shouted, "Work!" to a working world. He preached the very thing that has

made us rich and kept us ignorant. But his influence for good was enormous. Carlyle is like some Old Testament prophet. His words burn and glow. His face seems to shine with the light of God. His was a voice raised up for eternity and immortality, at a time when men were losing faith in their high destiny. We cannot read him without feeling the spell of his words. He was full of a noble fervour. His soul was sure of God.

THE TERRIBLE MISTAKE OF A SERVANT GIRL, AND THE HEROISM OF CARLYLE

There was one story about him which shows his courage. He had written the "History of the French Revolution," an immense work, and lent the manuscript to his friend Mill. By some terrible mistake this precious manuscript was burned by a servant girl. With this great misfortune all the toil and labour of years vanished in smoke up the chimney. When Carlyle heard it, he sat down and read Marryat's novels for a week; then he set to and re-wrote the History. Probably no other writer has ever had such a task to face.

His life was a long martyrdom to indigestion. His temperament was affected by this trouble, and he was not always as kind to his beautiful and brilliant wife as he might have been. She died in her carriage as she was driving round Hyde Park, after having received a telegram telling her of some great success of Carlyle in Scotland. Her death broke his heart. Filled with remorse for his harsh treatment, he spent his last years in mourning for this lovely woman, whom death had taken from him. His last years, if not his whole life, were a tragedy. But his works live, and men will feel the power of his mind for many generations.

EMERSON, THE SMILING PHILOSOPHER, WHOSE FAITH WAS IN THE SOUL

Ralph Waldo Emerson, our American essayist, believed, like Carlyle, in the uses of great men. "The race goes with us on their credit. The knowledge that in the city is a man who invented the railroad raises the credit of all the citizens. But enormous populations, if they be beggars, are disgusting, like moving cheese, like hills of ants, or of fleas—the more the worse." Emerson began life as a minister of the Unitarian Church. This church believes in one God, and declares that Jesus is the supreme human Authority. Emerson believed passionately in one God. He remained to the end of his days a devout admirer of the character of Jesus, but he could not feel that Jesus was the only and supreme Authority. He taught that a man's own soul was the chief revelation of God. Soon, therefore, it became necessary for him to leave his church, and he turned to literature and lecturing for a livelihood.

His face is described as "radiant" and "angelic"; his voice was full of beauty and intensest music. Such a lecturer soon had the world at his feet. "Emerson," says one writer, "was a sweet-tempered Carlyle, living in the sunshine; Carlyle was a militant Emerson, moving amid thunder-clouds." Both believed ardently in a spiritual destiny for man; both felt with glowing fervour the glory and satisfaction of God. While Carlyle declaimed, Emerson smiled. Emerson had the beauty of a tranquil faith, and the composure of a soul that was deeply touched by the sense of eternity.

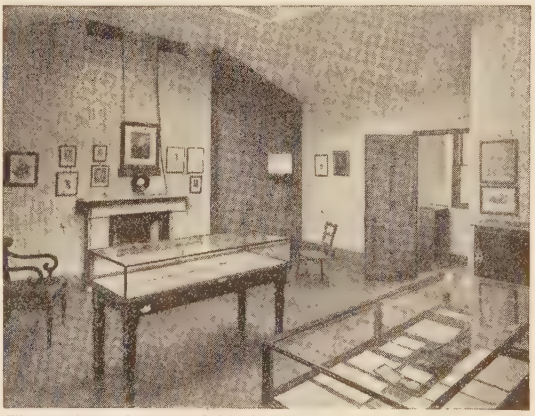
THE TEACHING OF RALPH WALDO EMERSON AND JOHN RUSKIN

The saying of Emerson, "Heroism feels and never reasons, and therefore is always right," expresses almost the soul of his teaching. He taught that no man can think or reason his way to the truth of the infinite universe. A good man, a pure man, whose soul is set to catch the splendour of God's power, will, on the other hand, find himself moved and influenced by the truth. "All goes to show," he wrote, "that the soul in man is not an organ, but animates and exercises all the organs; is not a function like the power of memory, of calculation, of comparison, but uses these as hands and feet; is not a faculty, but a light; is not the intellect or the will, but the master of the intellect and the will." His great faith was in the soul.

One of Emerson's most beautiful essays counsels men to follow the instruction of Jesus concerning prayer. "If he would know what the great God speaketh, he must go into his closet and shut the door," as Jesus said. God will not make Himself manifest to cowards. He must greatly listen to himself, withdrawing himself from all

the accents of other men's devotion. Even their prayers are hurtful to him, until he have made his own. This was his teaching, the direct relation between a man's soul and the God of the Universe. He inspired men to feel at home in the Infinite. He made them feel, too, that vice and cruelty and wickedness were base things, unworthy of them. Many people, of course, find fault with Emerson's opinions, but he remains head and shoulders above the great moralists and essayists produced by America.

John Ruskin, the son of an English wine merchant, besides being a capable man of business, was fond of pictures, statues, and fine buildings. Mrs. Ruskin was a handsome woman, very severe in her ideas, ungracious in her manner, but entirely excellent in devotion to duty. The little son of these parents had a strange infancy; his body, his brain, and his soul were watched over with an unceasing anxiety; he was not allowed to play with toys; his intellect was trained from the very first to observe Nature and reflect upon what he saw; many times he was whipped as a boy.



The study at the top of his house in Chelsea, where Carlyle used to escape from the noise of the hawkers in the streets.

Thus trained, he grew to be extraordinarily clever, particularly in all matters relating to art. He became an enthusiastic worshipper of great buildings and noble pictures. He conceived the theory that buildings and pictures are the outward and visible signs of a nation's inward and spiritual feelings; buildings and pictures *express* a nation's religious feelings. His books on these subjects made him famous while he was still young.

Then came the natural next step. From the glorious buildings of the past he turned to those of the present—to the factory town, with its hideous chimneys, its blackened walls, its dreary streets of unmingled ugliness; and he condemned the whole system which could produce such a state of things. He attacked men of science and politicians; he said that they were wrong; he denounced their philosophers, and derided their "laws of economy." It was enough for him that modern life wore a sooty coat and went on broken boots. He wanted sun, rose-coloured clouds, green pastures, and palaces of stone. He condemned the world.

But when with lavish generosity he himself endeavoured to set up model factories, the efforts proved a sad failure. No, not a failure; there is no failure in the work of a true soul. Although the co-operative and socialistic attempt at a model industry came to an end, the idea lived, lives now, gathers in force, and is destined one day to rule the world. For man does not live by bread alone. As the race advances, it feels how unsatisfying are the mere wages of labour. Each generation, a little better educated than the last, feels itself carried forward to a goal more honourable than that which satisfied the past. Beauty becomes a religion. Ugliness wears the look of sin. This was Ruskin's work; in some ways the greatest work of modern times. His long life was loyally spent in bringing home to the business and bosoms of men the thought of beauty—beauty in buildings, in paintings, in vesture, in manners, in conduct. The forces against him were enormous—the forces of mammon, prejudice, and ignorance. But he neither stumbled nor quailed. His gospel has spread to other nations; his ideas are growing in the minds of every class. We cannot doubt that the present system, which makes life so hideous and dull, will pass utterly away and Ruskin's gospel of beauty become the religion of humanity.

CARLYLE, THE MAN WHO DIGNIFIED WORK

Few thinkers have influenced their age more than did Thomas Carlyle, the rugged Scot who roared at the world and denounced hypocrisy. He preached the gospel of work, and some people thought he confounded might with right, but Carlyle always declared that this was the very opposite of his teaching. Here we see the aged "Sage of Chelsea," as Carlyle is often called, walking on the Thames Embankment near his home.

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Few who have not studied plants would think that the common white clover, or Dutch clover, seen in this picture, belongs to the same family of plants as the pea.

European furze, which seems so unlike both clover and pea, is another member of the same family. Nearly seven thousand different plants belong to the Pea Family

The European daisy shown, represents the largest of all the families of plants. There are ten thousand different plants belonging to this Composite Family, which includes the thistles, chicory, and dandelion.

This is the wild cabbage, that grows on the cliffs round England. It represents the Cabbage Family, to which belong mustard, horse radish, various cresses, woad, that gave the blue dye to the ancient Britons, and radish.

There appears to be little likeness between these three flowers, and yet they all belong to the same family as the rose. On the left is Alpine lady's mantle, in the middle wild cherry, and on the right stone bramble.

THE FAMILIES OF PLANTS

CONTINUED FROM 3952

One of the chief troubles that confront us when we seek to learn to know the flowers is the very great number of distinct kinds that grow even in our own country. In America alone there are nearly 2,000 different wild flowers, shrubs, and trees; but if we extend our study all over the world, we shall find that there are over 100,000. When we find a flower in the woods or fields and want to know its name, how is it possible to pick it out of a list of 2,000? It is not an easy matter at first, but many men, called botanists, have, by their labours, made the task much less difficult than it seems to us.

They discovered first that many plants, which differ widely in size and habit, in the shape of their leaves and in the colour of their flowers, agree in the arrangement of the parts of their flowers and the structure of their fruit.

These resemblances they regard as family likenesses, and by means of them they are able to arrange all these thousands of plants into small groups. Now, instead of hunting blindly through the descriptions of *all* the flowers, we have only to find by its structure to which family it belongs, and then to search through that family for the one that is most like the flower we have found.

In the Story of Animal Life, we learn that animals fall into similar groups. If, in walking through the streets, we meet with a fox terrier, an Irish terrier, a poodle, a mastiff, or a staghound, we know the type of structure so well that we could tell anyone that they are all dogs. And if we go to a zoo, and see a wolf there, we know at once that it belongs to the same family. So, too, with our knowledge of cats—tabbies, black, white Persians, and so on. When we see a lion or a tiger, we know that it is a cat of some kind—that is, one of the cat family. The same rule applies to all living things, whether animals or plants, and the discovery of these family relationships has simplified matters.

One of the first things we ought to do is to get a general idea of the chief characters that mark these families. We may, perhaps, know that our 2,000 wild flowers are divided up into nearly a hundred families, and it will be a pleasant pastime to pick out the flowers of different families in our walks.

Every boy and girl knows the beautiful wild rose, or dog-rose, that covers many hedges with its pink or white

flowers in June. Each flower consists of a green ball about the size of a pea, from the top of which spread five ragged green leaves. Above these are the widely spread, broad petals of a delicate pink or white tint, which are also five in number. Spreading over the narrow ends of these petals is a ring of green pins with yellow heads, and right in the centre of this ring is a cluster of hairy threads of a greenish colour.

The green ball is called the *receptacle*, and inside it are the *carpels* which contain the seed-eggs. After the flower has fallen to pieces, the receptacle will grow into the red egg-shaped "hip" that makes a fine show on the hedgerows in the autumn. The ragged green leaves are the *sepals*, the five forming the calyx. The five petals, as a whole, are spoken of as the *corolla*. The yellow-headed pins are the *stamens*, and the hairy threads are the *pistils*.

The Rose Family

Now, if we were to take a flower from an apple-tree, a plum-tree, a cherry-tree, a may-tree, a blackthorn, a bramble, a mountain-ash, a strawberry, and a meadow-sweet, we should find that, in spite of small differences, they are all constructed on the same plan. Between the plants that bear these flowers there is little resemblance. Some are trees, some shrubs, some lowly herbs; but, owing to their flowers being of the same type, they are all included in the great Rose Family.

There are several branches of the family, known by differences in their fruit. The apple, pear, mountain-ash, and white-beam have several tough-skinned seeds, that we call pips, in a horny core, composed of five carpels, or seed-vessels, which is surrounded by firm, juicy flesh. The cherry, plum, and blackthorn have only one large seed in a bony stone, covered with sweet, juicy pulp. In the strawberry, the receptacle itself becomes pulpy, and bears the seeds upon its surface; the bramble and raspberry wrap each seed in a separate globe of juice. Some of the rose family, like the cinquefoil, silverweed, and agrimony, have yellow flowers, and some of them are passed by as buttercups, because of their colour; but if they are compared with buttercups they will be found to be quite unlike them. Here, then, among these well-known plants, flowers, and herbs, we may get a good idea of what is meant by a plant family.

The Poppy Family

The Poppy Family is a small one, and its members may easily be detected. Its flowers are always of regular shape, and have only two sepals and four petals. The sepals drop off when the crumpled petals burst out and smooth themselves. The slender stamens are very many, but they all drop with the petals as soon as the seed-eggs in the big pistil are fertilised. In the true poppies, the pistil is a rounded or club-shaped knob with a sloping roof, on which the lines running from the centre to the edges are the stigmas. In the greater celandine and the horned poppy, the pistil is more slender, and lengthens greatly after the petals have been shed. In the horned poppy, which we may meet with at the seaside, it grows into a curved seed-vessel a foot long. The seed-vessel of the true poppies we all know as a poppy-head.

The Buttercup Family

The Buttercup Family includes not only plants with an open cup-shaped flower, such as everybody knows a buttercup to be, but also such strange shapes as those of the larkspur and the columbine. They have five sepals, five petals, many stamens, and many pistils, as a rule. Each pistil ends in a little point.

The Cross-bearer Family

The cabbage, cress, stock, mustard, radish, turnip, and a host of field and wayside weeds make up the large family of Cross-bearers—so-called because their four sepals and four petals are always placed crosswise. If we look at a flower of stock or wallflower, we shall see what is meant; then we shall always be able to tell one of this numerous family when we meet with it.

There are only six stamens—sometimes fewer—of which two are smaller than the others, and there is only one pistil, which grows into a long, slender pod, which usually splits down the sides to set free the one or two rows of seeds. Over sixty of the wild flowers found in this country belong to this family. With few exceptions, they are not very showy, and therefore are called weeds.

The Violet Family

The Violet Family is quite easily recognised, since its flowers are what are termed irregular, because its petals are not all of the same size or shape. There are five sepals, five petals, five stamens, and one pistil. The violet and the pansy are well known, so we can easily follow the description. One of the petals is larger than the others; this is really the upper petal, but, owing to the fact that the flower-stem always curves over, it appears to be the lowest petal. This petal is continued behind as a spur, or hollow tail, and in it the nectar is produced for the attraction of insects. Two of the five stamens have tails also, which extend back into this spur, and all of them end in flat points, which fit closely around the bent pistil. The stigma is simply a hollow ball.

The Pink Family

A larger family is that of the Pinks, which will be familiar to us through the pinks, carnations, and sweet-william of the garden. But we have many wild flowers also that belong to this family, among them campion, catchfly, corncockle, stitchwort, and chickweed. They all have their leaves in pairs, and often the lower ends of a pair are joined together around the stem. The flowers are always regular, the sepals and petals four or five in number, the stamens twice the number of the petals, and the pistil ending in two to five stigmas. In the pinks and campions the sepals are all joined together to form a stiff tubular calyx; in the chickweed and stitchworts they are separate. The seed-vessel is either long and cylindrical, splitting at the top into several teeth, or short and round.

The St. John's-wort Family

We probably know the large, yellow-flowered rose of Sharon that is often grown in gardens, though it is wild in some places. It is a member of the St. John's-wort Family, of which we have a dozen varieties among our wild flowers. They are mostly very upright-growing plants, with slender stems and smooth, oval opposite leaves. The flowers are yellow, with five sepals, five petals, a great number of stamens arranged in separate bundles, and a pistil that ends in three or five stigmas. Some of the plants, if we hold them up to the light, will be seen to have clear little dots on the leaves, as though they had been pierced through with pins; and some have raised black dots and lines along the edges of the leaves, sepals, or petals. The marsh St. John's-wort, that grows in wet places, has trailing stems and rounder, soft, hairy leaves.

The Geranium Family

The Geranium Family, though it includes the large and showy geraniums of the garden and greenhouse, is, so far as our wild plants are concerned, a family with small flowers as a rule. But they are all very pretty, not only in their flowers, but in their leaves also. With the exception of the yellow balsam, or touch-me-not, they all have quite regular flowers. The herb-robert, that grows commonly on wet rocks, and the wood-sorrel, that is abundant in spring in old woods, are among the best known of this family. There are five sepals, five petals, usually ten stamens, and the pistil ends in a stout style, which branches at the top into five stigmas. The plants with regular flowers have five streaks upon their petals pointing the way to the glands where the nectar is poured out. All of them have peculiar seed-vessels, so contrived that, when ripe, the seeds are shot off to a great distance from the mother-plant.

The Pea Family

The Pea Family is a very large one, and includes furze, broom, the vetches, medicks, and clovers. Most of them have the leaves divided into three or more leaflets, and the flowers are always irregular and of peculiar form. The five sepals are joined together. Of the five petals, one—known as the standard—is very much larger than the others, two others are known as wings, and the two smallest form the keel.

The last two often have their edges joined together, and between them will be found the ten stamens, and the long, curved pistil, whose thickened portion—the *ovary*—grows into the long pod we know so well in the case of the green pea. These pods are not always as straight as they are in the pea, the bean, and the furze. In the clovers it is short, in some of the medicks it is shaped like a reaping-hook, in others coiled on itself like a snail-shell. In this family are included all the clovers and vetches, rest-harrow, and beans.

The Saxifrage Family

Another large family, of which several members are well known to us, is the Saxifrage Family. They have small flowers as a rule, but these are always very pretty. The four or five sepals are joined together, forming a tube-shaped calyx, from which the five petals emerge. There are five to ten stamens, and an ovary with two to four stigmas.

The saxifrages proper are neat little plants, mostly growing on mountain-sides, of which the London pride of our gardens is the largest and best known. This is a wild plant in the west of Ireland.

In the golden saxifrages, that grow along streams and marshy places, the flowers are small and have no petals; but the sepals and the leaves adjoining are bright yellow, and make the plants very conspicuous.

The grass of Parnassus has a single large white flower. Between its five stamens are five broad scales fringed with knobbed hairs. Included in this family are also the currant and gooseberry. In the woods and copses of the North we may find both red and black currants, and the gooseberry also.

The Parsley Family

One of the largest of our plant families is the Parsley Family; and in almost every case when we meet with one of these plants we may know at once to which family it belongs. The flowers are very small, but there are many of them, and they are all arranged on slender stalks that radiate from the top of a thicker stalk.

If the wind caught our umbrella, blowing it inside out, and we stripped off the silk or alpaca, the framework would look just like the flowering stem of one of this family—the stick being the stout stem and the ribs the slender flower-stalks.

In most cases we need a magnifying-glass to make out the structure of the flowers clearly. There is a very simple calyx, sometimes having fine teeth along its rim, to show that it is composed of five united sepals. There are five very tiny heart-shaped petals of white or yellow—bluish in sea-holly—five curved stamens, and a quaint pistil with two stigmas. Some of the plants—such as hemlock and cowbane—are very poisonous; others are most useful as food or for flavouring. Among the useful plants are carrot, parsnip, celery, parsley, samphire, and caraway.

The Composite Family

Largest of all these families is the daisy family, known as the Composite Family, because a great number of tiny, stalkless flowers are packed together to form what is known as a flower-head. What we call a daisy flower is a bunch of about 250 flowers, or florets, of two forms, the outer row with a white strap-shaped corolla, and the inner one with yellow tube-like corollas. If we cut a daisy right through the middle we can see that this is so, and will understand why the family is called composite, or compound flowers. But all composite flowers are not exactly like the daisy; some, like the dandelion, the tansy, and the thistle, have only tubular corollas.

In addition to the flowers named, this family includes, besides others, the asters, dog-daisy, wormwood, colts-foot, groundsel, chicory, lettuce, sow-thistle, and goat's-beard. Among well-known garden composites are the dahlia, chrysanthemum, and sunflower.

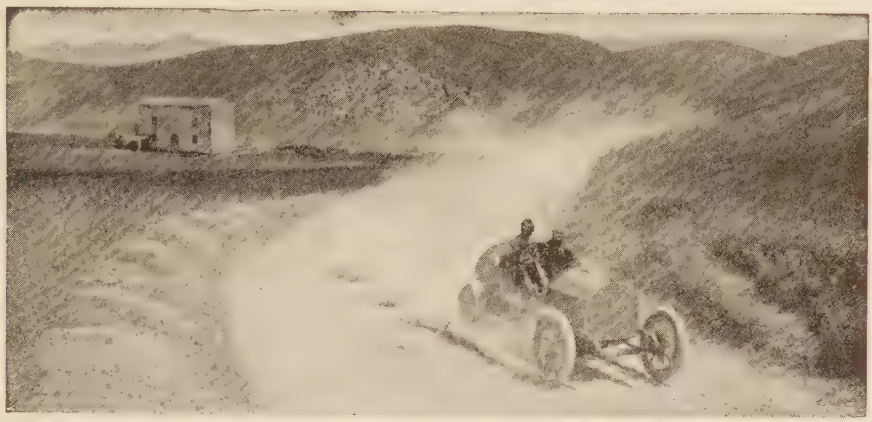
Some Other Families

There are so many plant families that it is impossible to describe them all. There is the Bellflower Family, of which the harebell, the Canterbury bell, the lobelia, and the scabious will serve as examples. There is the Heath Family, which includes, besides heath and heather, the bilberry, the cranberry, and the strawberry tree.

The Primrose Family has, beside primrose and cowslip, such well-known flowers as creeping jenny and pimpernel. To the Gentian Family belong the beautiful blue flowers that give the family its name; also the yellow-wort, the centaury, and the buckbean. The Borage Family gets its name from the borage, whose flowers have a brilliant blue of their own. Other members of this family are comfrey, bugloss, lungwort, forget-me-not, and hound's-tongue.

Besides these families there are the Nightshade Family, the Figwort Family, the Mint Family, the Orchis Family, the Lily Family, the Daffodil Family, and so on. We shall learn the differences between them as we read about the flowers on other pages.

The next story of Plant Life is on page 4185.



WHERE DOES DUST COME FROM?

CONTINUED FROM 3979

DUST is matter that has been ground or worn down into tiny separate pieces, like the sand in the desert, of which some pictures are shown on 4122 and other pages. If there is much water about, it catches the dust and makes it into mud; and then, when the mud dries, it is blown into dust again. There can be no dust at all on the moon; nothing is worn down into dust there. The forces that make dust on the earth are air, especially moving air that we call wind, and water. These are, perhaps, helped a little by the power of light. Of course, different kinds of things differ in the ease with which wind and rain can grind them down into dust, and so we find less dust in some places than others, even though both are equally exposed to wind and rain.

In places where men's feet or wheels of carts and carriages are travelling over and rubbing the ground, much dust is also made by them. That is one reason why cities are so dusty in dry weather. Water-carts lay the dust, because water is heavy, and when a speck of dust is soaked in water, it can scarcely be blown about in the air. In cities, also, much dust is made in the roads by horses, and it is probable that this is very bad for people's throats and eyes. But the most dangerous dust of all is the dust made by the spitting of consumptive people, and this really is one of the principal ways in which consumption is spread. Many people have worked hard for a law to prevent people making this deadly dust. Now in most cities there is a law against spitting in trains and street-cars and other public places.

DO WE GROW JUST AS MUCH ONE YEAR AS ANOTHER?

Certainly we do not. For one thing, whenever we have an illness our growth is affected—usually it is lessened; but sometimes it may be increased, and that makes a difference to our growth in that year. But even if we have no illness, and live exactly even lives from year to year, our rate of growth varies very much.

Both boys and girls, but especially boys, grow much more in the years from about fourteen to seventeen than they do at other times. Growth in height depends almost entirely on the lengthening of the bones of the legs; and it is the differences in the length of the legs that makes the difference in people's heights. That is why we cannot tell how much people differ in height when they are all sitting down. The bones of the legs grow in length by the making of new bones at certain places near their ends. After about the age of eighteen most

of these places stop working, and only those which are left can add to our height. Some do not grow much after eighteen. A few years later the rest of these places stop working, and the whole length of the bone becomes finally fixed. Some grow much more slowly after the age of seventeen or eighteen.

WHY DOES A LIGHT GO OUT IN WATER BUT FLARE UP IN PARAFFIN?

Water is burnt, or oxidised, hydrogen. Being already burnt, it can be burnt no more. When a light is dipped in water, it is deprived of the oxygen by which it is burning, just as a drowning man would be. There is a little oxygen dissolved in water, enough for fishes to burn or breathe by; but this is not enough to support a light. Perhaps it might be, but that water is a very quick and good conductor of heat. So when a burning thing, or a hot glowing thing, like a red-hot wire that is not burning, is plunged into water, it very rapidly loses a lot of heat to the water, and so it is lowered to a temperature or hotness at which it cannot burn, or glow, as the case may be.

But paraffin is a compound of carbon and hydrogen, each of which is very ready to combine with oxygen—that is, to burn—when it is made hot enough. A light put into it does this, and so the light flares up, because the paraffin starts burning. The products of its burning are water, H_2O, and carbonic acid, CO_2; and when the paraffin has been changed into these two substances, it can be burnt no more.

HOW MANY WORLDS ARE THERE?

This question could only be answered if we knew that we could see, or somehow knew without seeing, all the worlds there are. But all we can see, or otherwise discover, are doubtless nothing to the whole number of worlds. By means of photographing the light that comes through telescopes, we can discover not less than one hundred millions of bright worlds in the sky. If we had larger telescopes or more sensitive photographic plates, we should discover more, and every year we do discover more worlds. Still, one hundred millions of bright stars is an easy figure to remember.

Then we can prove the existence of a large number of stars which have "gone out," and are now dark and cold. But it is only a very tiny proportion of the dark stars that we can *prove* the existence of by their effects on the movements of the bright stars, and, so far as we can judge, the bright part of a star's history must be very short compared with the dark part. So we should require to add probably thousands of millions of dark stars to correspond to the bright stars that we know. Then our own sun has many large planets and moons circling round it, and hundreds of very tiny planets. If other stars have the same number, on the average, round them, we see that the huge number of worlds grows greater still.

WHERE DOES OUR WARMTH COME FROM?

Our warmth is all the result of the burning that goes on ceaselessly within our bodies. We do not realise how much this burning is, for we do not realise how much heat we are always losing from our bodies. If we lost no heat from our bodies, they would become as hot as boiling water in a very few hours. All this heat is made by the burning of our food. It burns, as other things burn, by combining with oxygen, and that is got into the body by our breathing. The chief part of the burning that produces our heat occurs in our muscles and in a large gland, the largest in the body, called the liver.

We may think of the muscles as the fireplaces of the body, and the fuel burnt there is mostly fat and sugar. A great deal of heat is produced when a muscle contracts, and that is why hard exercise makes us so hot; but, even when the muscles are still, this burning and making of heat are always going on. The liver, too, is always active, and we know that the blood leaving the liver is considerably hotter than the blood going to it.

Though all parts of the body do not produce equal warmth, they are all kept at just about the same temperature by the circulation of the blood—which takes heat from the hottest places, such as the liver, and gives it to the coldest places, such as the fingers and toes.

WHAT DID THE FIRST LIVING THING IN THE WORLD EAT?

This is one of the most important of all the questions that have to do with the beginning of life on our planet. When we study the food of animals, we find that they all, without exception, depend for their food upon the work done by other living creatures—either plants or other animals that live on

plants. Therefore we are quite sure that the first living creatures on the earth cannot have been animals. Even if animals had been brought to the earth from some other world, there would have been nothing for them to eat, and they must have died of starvation.

Now, when we study the food of plants, we find a great difference. They can live entirely on things which have been made, or can be made, in the air and in the soil, without the action of life of any kind. Hence we know that plants must have lived before animals on the earth, and that the first living creatures must have been plant-like.

We say *plant-like*, rather than *plants*, because they were, perhaps, very different from any plants that exist on the earth to-day—perhaps simpler than the simplest living cell we can find anywhere. And, like most plants of to-day, they must have lived upon water, the carbonic acid of the air, and the various salts, not needing to be made by the action of life, that are found in the soil. Important above all must have been the salts containing nitrogen, washed down into the soil by the rain from the air when they began to be made through the action of electricity in the oxygen and nitrogen of the atmosphere.

IF RADIUM COULD BE TAKEN TO THE NORTH POLE WOULD IT CHANGE THE CLIMATE?

In answer to this question we must be allowed to ask : How much radium ? Of course, it all depends on that. A little radium produces only a little heat, though a very great deal in proportion to its quantity ; while a lot of radium produces a lot of heat. If we could take a quantity of radium to the North Pole, beyond any doubt it would alter the climate there for thousands of years. If enough were taken it would make a tropical climate everywhere.

The time may quite well come when men may change the climate of the colder parts of the earth in some such way as is suggested—perhaps for the first time—in this question ; and in the days to come men will need to make every part of the world habitable that they can, for the number of human beings in the world is always increasing. But if all the radium that has been separated from the things among which it is found were gathered into one room, no one would notice any difference in the temperature of the room, so small is the amount of radium that the chemists have yet extracted. It will certainly be a long time yet before there is enough radium collected to weigh a pound, and then that pound will be worth an enormous sum of money, for it will have cost years of labour to collect. But the time may come when we shall learn how to make radium from other elements quite easily, and then the sort of thing that is suggested in the question will be quite possible.

WHY IS GOLD NOT FOUND IN ENGLAND?

This is really a special way of asking a general question. Why do we find the various elements where we do, and not elsewhere ? We are only just beginning to get the knowledge which will perhaps some day enable us to answer this question. Until quite lately, most people thought that the elements, such as gold, had always existed as they are now, and so there was no use in asking the question : Where did they come from ?

If we thought this, we could never hope to say why gold is found in certain parts of the world and not in others. But now we are beginning to learn that the elements have a history. In a few years we may learn how gold came into existence—what other element or elements it was formed from ; and so in time we may hope to learn how to explain the present distribution of gold and the other elements in the earth's crust.

We must always remember that gold, like most elements, is much more widely distributed than most people suppose. We usually only hear about the presence of a precious element anywhere when there is enough of it to pay for getting it out. But gold occurs in traces almost everywhere, just as the far rarer element, radium, does. It is found in sea water everywhere, and even in some kinds of earth in parts of England ; but there is not enough to be found to pay for the trouble of getting it out.

IS THERE ANY OF THE HISTORY OF ENGLAND UNDISCOVERED

Certainly there is. Of course, we do not mean its recent history, for that goes back only about two thousand years, and it must be many thousands of years since England was broken off from the Continent of Europe by the English Channel. There are only Stonehenge and one or two more such places to help us with the history of

England as it was long ago, and Stonehenge tells us that a very clever race of people, who knew a lot about the skies and who could raise huge stones, lived in England 1,600 years before the birth of Christ; and that is all we know about them. We do not know what became of them, and we do not know where they came from—whether they sailed across the sea, or whether their ancestors were already in England when England became an island.

Plainly, we cannot say that all the history of England is discovered when we do not even know how the first men got into it. The part of the island's history that we know is only like the history of yesterday compared with the vast part that must now be lost for ever.

WHY CAN WE OFTEN SEE THE WHOLE CIRCLE OF THE MOON WHEN IT IS NOT SHINING?

The reason is that the earth shines brightly by the sun's light, just as the moon does; and the earth's light is enough to light up the moon, so that we can sometimes see even the part of its face that is not lit by the sun.

There is a very curious and celebrated mistake in a famous English poem, which shows that the poet did not at all understand the moon, and apparently had never seen what we have seen. It is "The Ancient Mariner," by Coleridge. He speaks of

> The horned moon, with one bright star
> Within the nether tip.

Of course, no one ever saw a star within either tip of the crescent moon, because the rest of the moon is there, and would hide the star. The nearest star is, of course, many millions of miles farther away than the moon. If Coleridge had ever seen the moon as described in this question, he could not have made such an extraordinary mistake.

WHY CAN WE NOT SEND A LETTER WITHOUT A POSTAGE STAMP ON IT?

Well, there is no reason why we should not send all our letters without stamps on them, provided that we could find some hundreds of thousands of people to do the work of postmen and sorters and post-office officials, and railway servants, and that we could get other people to make and maintain railways and engines, and to dig coal to drive engines—and a few other things like that—all without payment.

We write a letter and drop it in a letter-box, and it reaches our friends a hundred miles away, or perhaps in Australia, and we think no more about it. But an enormous amount of human labour is required. If we think of sending a letter to England, which we can now do for 2 cents, we must include all the work of the men who make the ships and the compasses, the sailors who work them, and the people who make the harbours. If these things did not exist, it would cost thousands of dollars to send a letter across the world; and railways cost so much to make that it would cost thousands to send a letter quickly even across America.

But as millions of people have letters to send, and as we can always count on their continuing to want to send letters, preparations can be made, and then their millions and millions of pennies, put together, will pay for everything, and enable each of them to send a letter thousands of miles for 2 cents. So the question we should have asked is not, Why can we not send a letter without a postage stamp on it? but Why does it not cost ten thousand dollars to send a letter?

CAN ANYTHING TRAVEL FASTER THAN THOUGHT?

We sometimes say "as quick as thought," as if thought were the quickest thing in the world; but that is very far from true. When we think, waves of something—we can only call them nerve-currents—travel along the nerves inside our brains. So if we want to measure the speed of thought, the best way to do so is to measure the rate at which a nerve-current travels along a nerve.

This cannot possibly be done directly in anyone's brain; but we can do it in other ways. We can take a long nerve, such as we find in the arm or the leg, and by the use of delicate electrical clocks we can find how fast it carries its messages. About the speed of an express train is what we find. That is very slow compared with the speed of the earth, and slowness itself compared with the speed of light. So "as quick as lightning" means far more—*millions* of times more—than "as quick as thought."

Now we can do another thing. We can find out how long a person takes to distinguish between, say, a red colour and a black colour. When he

sees red he is to do a certain thing, and when he sees blue he is to do something else—as quickly as he can. We can measure exactly how many hundredths of a second this takes to do; then we can subtract the time taken in running to and from the brain, and we find that most of the time was spent in the brain—spent in the thinking. So we must conclude that thought is not really a speedy thing at all; but we must remember that speed is not everything.

WHY DOES A HEN NOT CROW?

When we study birds, we find it a general rule that the male birds are the most brightly coloured, and it is the male birds that sing. The feathers of the female birds are usually less bright, and their voices are not so melodious. It is probable that both the bright colouring of so many male birds—compare the peacock with the peahen—and their singing are things that have been evolved to make them prominent and pleasing in the eyes of the females. Among animals it is usually the females that choose the males they like best, which are usually the finest specimens of their kind; and it would certainly be better for the progress of human beings if that were more the rule among ourselves also.

We may say that the crowing of a cock is not to be called singing, and certainly it is a very ugly noise compared with the singing of the lark, or the thrush, or the nightingale; but still it is really the cock's way of singing, and probably it gives pleasure to the hens. Even among ourselves the notion of what is nice singing varies very much with different people, and the hen has as good a right to her opinion of the cock's singing as we have.

WHY DOES A NEWSPAPER STRETCHED ACROSS A GRATE MAKE THE FIRE BURN UP?

The effect of the newspaper is really the same as the effect of blowing the fire with a pair of bellows. All burning depends on the supply of air. The more quickly fresh air—that is, the oxygen in the air—is supplied, and the more quickly the gases produced by the burning are blown away from the fuel, the more brightly will the fire burn. The fire makes a draught for itself up to a point, for the gases it produces are hot, and so rise, while fresh air comes in to fill the space they tend to leave empty. If we want a very hot and quick fire we make a forced draught, as we do when we use a pair of bellows. The newspaper greatly increases the draught of air through the fire, by preventing any air from getting up the chimney except by first passing right through the fire from below the grate.

The air usually travels up the chimney when a fire is lit at the rate of about three feet in each second. That is why a fire helps to ventilate a room. But much of this air gets into the chimney above the fire and does not help it to burn at all. When we use a newspaper we stop this; and the air has to pass quickly right through the grate. It is one of the stupid things about an ordinary fire, accounting for most of the smoke it makes, that we pile the fresh fuel on the top, where much of it is blown up the chimney unburnt, by the burnt gases of the fire, instead of adding it at the bottom, where the fresh air can act on it.

WHY IS IT THAT PURE OXYGEN WILL KILL US?

This question rather reminds us of the lawyer's question: "Have you left off beating your wife?" No matter whether the man answers "Yes" or "No," he is in a difficulty. A question like this is what students of language call a double question, and we must always be on the look-out for such questions. The lawyer assumed the answer "Yes" to another question: "Have you ever beaten your wife?" And here you are assuming the answer "Yes" to the question: "Does pure oxygen kill?"

Pure oxygen does not kill. It may be breathed for hours with the greatest benefit by persons who are ill, and it often helps to keep them alive. It is used for this purpose all over the world every day. It is quite reasonable that if a person cannot breathe quickly enough and strongly enough to get into his blood all the oxygen he requires from a volume of air of which only one-fifth is oxygen, he may yet be able to get all he needs if he breathes an air, or atmosphere, which consists entirely of oxygen. When we understand how important oxygen is, we shall see why it is that runners, and even racehorses, are said to run more quickly if they are dosed with oxygen. But we are not certain

that this statement is true, or can be borne out, and it would require a great many experiments to make us sure of it. It is quite probable, however.

The notion that pure oxygen is harmful probably has an element of truth in it. If we were all taken to an atmosphere of pure oxygen, and never had anything else to breathe, our living would probably be very much disturbed; it might be that our brains would become far too much excited, and so all sorts of disasters might happen. We do not at all know what would be the effect on a healthy person of breathing nothing except pure oxygen for hours or days at a time; but we shall probably learn all about it before long.

WHY DOES A SENSITIVE PLANT DROOP WHEN TOUCHED?

When we call the plant sensitive, we mean that the plant feels, and there is no doubt that the plant does feel the touch. We must beware of thinking that the plant's feeling is just the same as our own. Yet it is believed that we ourselves can feel just as the plant does. If we look at someone—a child, or anyone else—who is asleep, and then if we move the bedclothes so that the cold air strikes the arm; or if we touch the skin of the face with a feather, the person will move. Now, something has been felt *somewhere*. It is not like the feeling of a person fully awake, but it is very much the same as the feeling of a sensitive plant.

Plants have no muscles, but they have many other ways of moving. They have elastic fibres, and many kinds of fibres which can become shorter or longer, and which, though they are not muscles, really act in much the same way as the fibres that make up muscles. As for nerves, we always think that plants have none, but we are just beginning to learn that, perhaps, they have nerves; by no means the same as the nerves of an animal, but something that does the same work.

If the question means what is the use of the drooping, then we may say that the plant protects itself by shrinking up into smaller space when it is touched. The touch, for instance, might be that of some insect which might hurt the plant, and if the plant droops, perhaps the insect will miss it, and turn to some other plant that does not droop.

WHY ARE THERE NO GREEN FLOWERS?

Every part of a plant has its business, its own special purpose in serving the life of the plant. The leaves exist in order that the plant may get the kind of food it needs from the air, and the green stuff of the leaves is necessary, as we know, for this purpose. The flowers of the plant have a wholly different purpose. They exist, not for the sake of the plant that bears them, but for the production of new plants that shall carry on the life of the parent plant when it is dead. The part of the flower that is usually most conspicuous is the petals, and these, as we learn when we study the way in which the plant develops, are changed or modified leaves.

But they are not green, because, firstly, the plant produces plenty of green leaves in other places; and, secondly, because if they were green they would not be noticed by insects. The plant usually depends upon the visits of insects to its flowers in order that it shall get from some other plant of the same kind, which the insect has already visited, what it needs to fertilise its flowers, so that the seeds in them shall grow into new plants. The insect is therefore helped to find the flowers by the colour of its petals being different from the colour of the leaves.

IS CHLOROPHYLL THE COLOURING MATTER IN RED FLOWERS?

No; the colouring matter of red flowers, and of flowers in general, whether red or blue or white or yellow, is not chlorophyll, but something else, the nature of which differs in various flowers. The business of chlorophyll is to feed the plant by means of sunlight; but the business of the flower is not at all with the feeding of the plant; the flower does not exist for the plant that bears it, but for the future. Its business is entirely to do with the bearing of the seeds from which future plants will spring.

The flower is the part of the plant which is made special, or specialised, as we say, for this purpose. Therefore, we should not expect to find chlorophyll in the flower. The proper place for chlorophyll is in that part of the plant that is concerned with the upkeep and health of the plant in question, not in the part that is given up to the future of the race. If chlorophyll were present in the flowers, it would be

very much more difficult for insects to recognise the flowers among the green leaves, and one of the great duties of most flowers is to make themselves conspicuous, in order that the various insects may visit and fertilise them.

There are varieties of chlorophyll which are not so much green as brownish green, or even a rather yellowish green. We find some of these in sea plants, such as sea-weed, but there is no such thing anywhere as a red variety of chlorophyll.

WHY DOES A POTATO NOT ROT UNDER THE EARTH WHILE IT IS GROWING?

If certain kinds of low vegetable life are present in the soil they may attack even the living potato and rot it; the consequences may be terrible if a whole population largely depends on the potato for food. But usually the potato is protected by two things.

One is its skin, which exists in the case of the potato, as it does in many other vegetables and fruits, chiefly in order to keep out microbes and other things that would otherwise feed upon it and rot it. The other thing is the life in the living cells which make the potato, and especially those cells which lie on the outside of it and are the best part of its food-value, which is commonly lost when we pare potatoes before cooking them. These cells, so long as they are alive, have the power, as every living cell has in some measure, of protecting themselves from most dangerous things, such as microbes or insects.

When a potato rots it is because some other living things are using it as their food. The rotting of the bodies of animals and plants is not to be thought of as something really bad or horrible. It is simply a chemical change produced by the life of other living creatures: their life benefits as the thing they feed upon suffers. Rotting is really, therefore, a kind of digestion.

SHALL WE EVER BE ABLE TO GET TO ANY OTHER PLANET?

One of the greatest men who ever lived, Charles Darwin, said that the really unwise people were those who thought it specially wise to say that men would never be able to do or to know this thing or that, and the history of knowledge has justified him. But even when we remember what Darwin said, we are still inclined to think that the answer to this question must be "No." Jules Verne wrote a clever and delightful story about some men who were shot inside a huge cannon-ball to the moon; and even that is certainly not a possible thing now. But the moon is only 240,000 miles away, and the solar system would have to change a great deal for our earth ever to be within even 20,000,000 miles of another planet. Nothing could fire a hollow ball fast enough to go so far, even if the direction could be controlled, and even if people inside it could survive the shock of being fired off.

But let us suppose that men could invent some machine that made power in itself, and could keep on doing so, such as a flying-machine. The first difficulty is that, when it got very high, even if the passengers took air with them to breathe, there would not be enough air for the machine to work against. In a vacuum—a space empty of air—the strongest bird could not soar or sustain itself. You might as well try to swim at the usual level in an *empty* swimming bath.

Now, suppose this difficulty did not exist. Even then there would be another which would be fatal. The passengers would have to travel millions of miles through the cold of space. None of us can imagine how cold that is, and it is certain that only a few minutes of it would freeze any human being to death. Even if they travelled to Mars with the speed of light—and we are sure they never could—they would certainly be dead before they got there.

SHALL WE EVER BE ABLE TO TALK TO ANY OTHER PLANET?

This is a very different question from the last. Of course, we must assume that the other planet, say Mars, has intelligent beings upon it, which is quite likely. If that were so, there is no real reason why we should not communicate with them in some way. Of course, they would have to learn how to understand what we meant; but that would not be nearly so difficult as it sounds. As a matter of fact, in France, a large prize awaits the first person who establishes communication with any planet, and perhaps someone may one day be able to win that prize. If there are intelligent beings on

Mars, they are probably far cleverer than we are, for Mars is a much older world than ours, and there has been more time for these beings to learn and grow wise, if they are there at all. Indeed, perhaps they have been trying to attract our attention for ages, and are wondering when the earth-people will grow wise enough to attend to them. It has been even suggested, though not quite seriously, that the great system of canals on Mars—which is quite big enough for us to "read"—is a huge writing, meant to say something to us.

At any rate, the canals prove that communication between Mars and the earth is by no means an impossibility; and if the people of Mars have telescopes as good as ours, they could certainly read anything we wrote large enough in the Sahara Desert or Siberia.

WILL THE EARTH EVER STOP SPINNING?

We know now, quite well, that nothing stops spinning or moving about unless something stops it. A top would not stop spinning but for the resistance of the air and the surface it spins on. The question is, then, do we know anything going on now, or anything that is likely to happen in the future, which may stop the spinning of the earth? The answer is, that the tides have this effect, though many ages may pass before it is shown; that perhaps the mere presence of the ether in space has some effect of resistance; and that in all probability the earth will, therefore, stop spinning some day or other.

WILL THE SUN EVER COOL DOWN AND HAVE THE SAME TEMPERATURE AS THE EARTH?

Yes, this must happen. Indeed, the cooling down must go farther than that, and the sun, if it is to remain as the sun, must certainly become quite cold all through, which the earth certainly is not yet. This need not happen if the sun were to meet some other star, and by the force of meeting be made hot again; but then, of course, it would not be our sun any longer. Our sun would have disappeared, though the stuff of which it is made would remain.

To make something from nothing is an impossibility. Every moment, without ceasing, the sun is giving out enormous quantities of power in the shape of light, and heat, and other things. If the sun were all the time getting from somewhere else as much power as it is giving out, then, as long as that supply is kept up, it need not cool down. Astronomers have very carefully studied this question. The sun gets a certain amount of power from shooting-stars falling into it; it also gets a certain amount of power from the light of the other stars. This is nothing, however, to the power the sun is spending. It must necessarily, therefore, cool down, and become, we have no doubt, like the countless thousands of cold stars or suns which we know exist in the sky.

CAN CHEMISTRY BUILD UP LIFE?

No, chemistry certainly cannot build up living matter yet, and perhaps it never will be able to do so. But we ought to know how far chemistry can go in this direction. It was long believed that none of the things made by life, such as sugar or alcohol, could possibly be made in any other way.

Just eighty years ago, however, a compound called urea, which is one of those made inside our bodies, was made by a chemist *outside* his body; and now chemistry can build up thousands of compounds which are made by living things, and can build them up from their separate elements. This teaches us that chemistry inside living things cannot be so very different from chemistry outside them. But the compounds of the class of white of egg, usually called proteids, are those which, more than others, distinguish living things; and the chemists are as yet only able to make compounds which are *nearly* proteids, but not quite.

No doubt, chemists will soon be able to make all the compounds that compose living matter, or protoplasm, and then call the mixture protoplasm. But it will be only *dead* protoplasm, we may be very well sure. Living protoplasm is far more than a mixture of proteids and sugar and salts and water. It has an architecture, and is as much more than a mixture of these things as a noble building is more than a heap of bricks. The bricks need a builder to make them into a cathedral, and the compounds that compose living matter need a builder to make them into protoplasm—living protoplasm; and as that builder is Life, we shall be almost as far from making life when we can make proteids as we were 100 years ago.

HOW DOES CAMPHOR KEEP MOTHS AWAY?

Camphor, like most other things that have a smell, is what we call *volatile*—that is, it gives itself off into the air in the form of a gas. Like many other volatile things, camphor is an *antiseptic*, a thing that is very bad for the lives of microbes. Now, most things that are poisonous to microbes are poisonous to insects. Indeed, as a rule, a poison to any kind of life is a poison to all kinds of life.

Camphor in large doses would kill a man. The camphor gives itself off into the air around it, and as it is very poisonous to moths, when a moth smells camphor anywhere, it flies away. It is a great advantage when an antiseptic is volatile, and all the most useful antiseptics are volatile. If a thing is not volatile, it can only have its effect on anything that actually touches it, and perhaps not even then, unless the thing actually starts to eat it, which is not likely.

If an antiseptic, such as camphor, is volatile, it flies about in the air everywhere. Of course, as it spreads, the amount of it in the air gets less; and so insects or microbes can get within a certain distance and not suffer; but they cannot go nearer, or else they would be killed. Everything we use to preserve clothes by putting them in a drawer is therefore volatile, and so can protect the whole drawer.

IF OUR SKIN IS WATERPROOF, WHY CAN MOISTURE PENETRATE THROUGH IT?

The skin is truly waterproof, and will let nothing from outside get into it, even if we stay in the sea for hours at a time. If this were not so, bathing would be a very dangerous business. But the skin is almost everywhere pierced by tiny little tubes that run out through the waterproof layer to the surface, from the true skin that lies underneath it. These tubes carry the sweat which is made by the little glands in the true skin, from which the tubes run. Water could, perhaps, get into these tubes, so that the skin would not be waterproof, if it were not that the sweat is coming out of them. As it does so, it has a forward pressure which forces back anything that might enter. And even if it did enter it could not get far, for it would find itself in an exceedingly tiny blind alley—the inside of the sweat-gland.

If we rub anything into the skin very hard, and if it is something, such as cod-liver oil, which the sweat-glands are willing to take up into themselves and give to the blood, we can succeed in making it pass inwards through the skin. Also, by means of electricity, we can make liquid things pass in through the skin. But otherwise it is truly waterproof—in one direction.

It would be a very good thing if men were clever enough to invent waterproof clothing that had the same property as the waterproof clothing with which we are all provided by Nature! The trouble is that our waterproofs are waterproof in *both* directions. They keep the rain out, and that is good; but they keep the sweat in, and that is bad. This is the reason why we soon get so hot and muggy when we happen to be obliged to wear a waterproof on rainy days.

WHY DOES OUR HAIR GIVE US NO PAIN WHEN IT IS CUT?

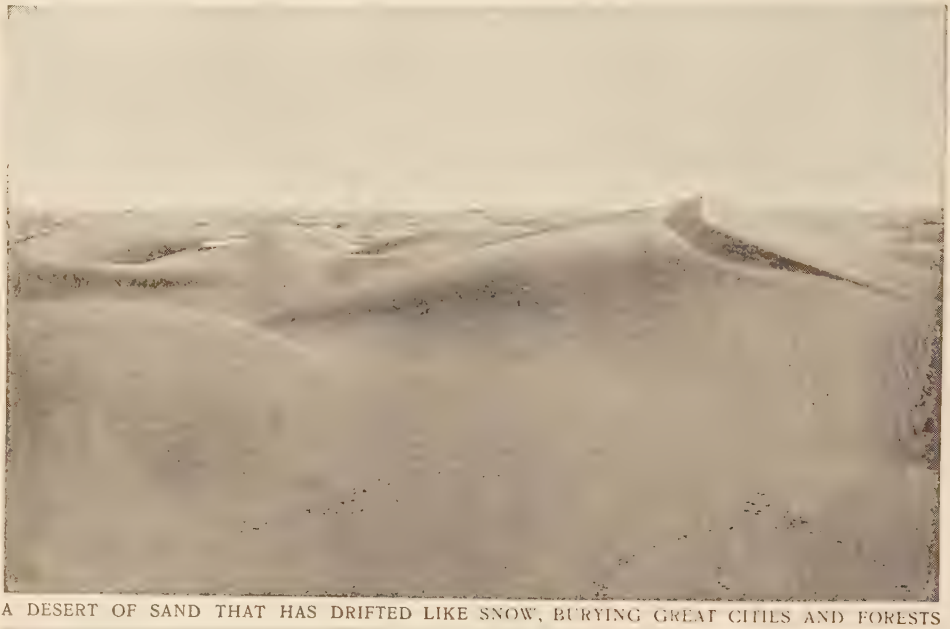
Whenever we feel pain it is because something has disturbed a nerve or nerves that are capable of carrying a message to some part of the brain where there are nerve-cells which can feel pain. If the nerve-cells are out of action because we have got chloroform in our blood, we feel no pain. If the nerve has been cut, or has become dead, so that its message cannot be carried, then we feel no pain, even though someone should be cutting off our skin with scissors. And if there are *no nerves* in any part of the body to carry a message, then certainly we cannot feel pain, no matter what is done to that part of the body.

This is the case with hairs. The living root of a hair, where it is made, in the true skin, is supplied with nerves, and so pain is felt if it is disturbed. But no hair in ourselves or in any animal has a nerve in it, and so cutting the hair cannot cause pain. But pulling it does, for that disturbs the hair-root, which has nerves. Nails are much the same as hair, and in the nail itself there are no nerves, so it can be cut without pain. But by far the most curious thing is that the surface of the brain itself has no nerves of the kind that can really feel a touch or a cut; so no pain at all is felt if the brain is touched or cut.

The next Questions are on page 4229.

THE WONDER OF A WORLD OF SAND

Travellers who have journeyed in the heart of Asia, across trackless deserts of sand that are ever getting wider and wider, have found, deep down under the sand, the ruins of great cities, and beautiful temples, and extensive forests. Everywhere is evidence that these vast, silent lands were once a flourishing garden, thronged with a prosperous people who travelled, and traded, and manufactured. Great lakes and rivers and a large inland sea watered the country that is now so dry; but an enemy that no man can stand against is ever invading the land, and now the heart of Asia is buried under a great ocean of sand, as may be seen in the pictures on these pages. There is now one power, and one power only, that brings sound and movement into these dreary, lifeless wastes, says Dr. Sven Hedin, the famous explorer, and that is the wind.



A DESERT OF SAND THAT HAS DRIFTED LIKE SNOW, BURYING GREAT CITIES AND FORESTS

A MOVING HILL OF SAND THAT THREATENS TO COVER A RIVER AND FOREST IN THE DISTANCE

MOUNTAINS BUILT UP BY THE WIND

SAND-HILLS NEAR THE TARIM RIVER, SHOWING THE CURIOUS RIPPLE-MARKS MADE BY THE WIND

THE ENTRANCE TO A GREAT MOUNTAIN PASS THAT IS FAST BEING FILLED WITH SAND

MOUNTAINS OF SAND OVERLOOKING THE TARIM RIVER, BUILT ENTIRELY BY THE WIND

AN EVER-ROLLING OCEAN OF SAND THAT BURIES A CONTINENT

AS THE WIND BLOWS OVER THE DESERT IT CAUSES WAVES OF SAND LIKE THE SNOW-WAVES SHOWN ON PAGE 2518. THESE WAVES GROW INTO DUNES, OR HILLS

The pictures on these pages are reproduced, by permission, from Dr. Sven Hedin's "Scientific Results of a Journey in Central Asia."

A CAMPING GROUND IN THE DESERT WITH MILES OF SAND ALL ROUND

DR. SVEN HEDIN TRAVELLED ACROSS THE VAST DESERT OF GOBI, SHOWN IN THIS PICTURE, AND DISCOVERED, UNDER THE SAND, THE REMAINS OF RUINED CITIES

THE NEXT BOOK OF WONDER BEGINS ON PAGE 4229

THE SOLDIER CLIMBED UP THE TREE

"It seems a simple enough matter," said the soldier. "But I should like to know how I am to get down inside the tree." "Fasten this round you, and leave that to me," said the witch, holding out a long rope.

THE MAGIC TINDER-BOX

CONTINUED FROM 4008

TRAMP! Tramp! Tramp!

A handsome young soldier who was returning from the wars, with his knapsack on his back, came upon an old witch standing in the road.

"Good-morning," said she. "It's a fine thing to be rich, isn't it?"

"I don't know," returned the soldier. "I'm so poor that I've not a penny in my pocket."

The old witch came a little nearer.

"Shall I make you rich?" said she.

The soldier almost dropped his knapsack in his excitement.

"Upon my word, I wish you would!" he exclaimed.

"Then listen," said the witch. "Do you see that tree yonder? Go near, and you will find a hole in the trunk through which you can let yourself down into a cavern full of treasure. Within are three doors; open one, and you will find yourself in a little room. In the middle stands a chest full of copper coins, and on it sits a dog with eyes as big as teacups. But have no fear; pick him up in your arms and put him on this blue-checked apron which I will lend you, and take all you want.

"If you prefer silver, open the next door you come to, and you will find another little room. In the middle stands a chest full of silver coins, and on it sits a dog with eyes as big as mill-wheels. But have no fear; pick him up in your arms, put him on the apron, and take all the silver you want.

"But perhaps you prefer gold? If so, you must go to the third door. Open it, and you will find yourself in another room. In the middle stands a chest full of gold coins, and on it sits a dog with eyes as big as the Round Tower. But have no fear; pick him up in your arms, put him on the apron, and take all you want."

"I'm sure you're very kind," said the soldier; "but I'll warrant you'll be expecting a nice little pile for yourself!"

"Not a penny," answered the witch. "All I want is my old tinder-box, which my grandmother forgot to bring up with her the last time she was there."

"Well, that seems a simple enough matter," said the soldier. "But I should like to know how I am to get down?"

"Fasten this rope round you, and leave that to me," said the witch.

So the soldier climbed up the tree, and the witch let him down through the hole in the trunk. Down, down, down he went, until he landed safely on the floor of the huge cave, which was ablaze with a thousand lights.

He found a door, opened it, and there, sure enough, on a chest in the middle of the room, sat the dog with eyes as big as teacups. The soldier lifted the dog on to the blue-checked apron, opened the box, and filled his great pockets with copper coins.

"My word, I'm a lucky man!" he said to himself.

He shut the lid, put the dog back on the box, and went out.

Just then he caught sight of another door. Turning the handle, he went in. In front of him stood a great chest, and on it sat a dog with eyes as big as mill-wheels, just as the witch had said.

He picked up the dog, set him on the blue-checked apron, and opened the chest, which was filled with silver.

"This is worth having," said the soldier, tossing out the copper coins, and refilling his pockets with silver.

When they would hold no more he replaced the dog on the chest, and was turning to go when his eye fell upon a third door, which he opened. In the middle of the room stood a chest, and on it sat a huge dog with eyes as big as the Round Tower. The soldier was terrified, but, remembering what the witch had told him, he summoned all his courage, lifted the dog and set him on the blue-checked apron. Then he flung open the lid, and was amazed at the mass of gold coins that lay there before his eyes.

With both hands he grasped his treasure, and thrust as many coins as would go into his pockets. But they were already so full that many of them fell out about his feet.

"Why should I concern myself with silver when all this gold is mine for the taking?" he thought; and, slipping off his coat, he turned it upside down till all the pockets were empty. Then he refilled them with gold, shut the box, put back the dog with eyes as big as the Round Tower, and made his way to the foot of the tree-trunk.

"Don't forget my tinder-box," called out the old witch from above.

"That's just what I have done," said the soldier, turning back.

He found the box, and was pulled up through the tree.

"What do you want with this old box?" asked the soldier, as he stood once more beside the witch. "It must be very valuable."

The old woman made no reply, but kept her eyes fixed on the box.

"Tell me the secret of the box—for I am sure there is one—or I will certainly cut off your head," said the soldier.

"Give me my tinder-box!" screamed the old woman. "You have gold enough, would you rob me of my box?"

"Yes," replied the soldier brutally; and without more ado he drew his sword, and with one sweep cut off her head. Then he picked up his knapsack, and made his way to the nearest town.

Here his money brought him many friends. He lived in a grand house, and had a number of servants to wait upon him. For a long time, indeed, he lived gaily in great style; but at last there came a day when his money was all spent, and he was forced to move into a tiny room in the poor part of the town.

As he was sitting alone one evening in the dark—for he was too poor to afford a light—he suddenly remembered the old tinder-box. He dragged it from where it lay almost forgotten, and opened it, and at the bottom, to his delight, he found a few matches. He struck one against the box, but no sooner had the spark appeared than the door of the room flew open, and in burst the dog with eyes as big as tea-cups.

"What commands has my master for his slave?" said he.

The soldier was amazed.

"My word!" thought he. "Then this must be the secret of the tinder-box. It will evidently bring me whatever I choose to ask for.

"Bring me money," he said aloud, whereupon the creature vanished, and in a few minutes he was back again, holding in his mouth a large bag full of money.

Soon the soldier found out that by striking the flint once the dog that sat on the copper chest came to him; by striking it twice the silver dog appeared, and by striking it three times he could summon the guardian of the gold treasure.

That day there was no happier man in all the town. He returned to his grand house, and once more lived a life of gaiety, and had everything he wished for.

Now, in this town there lived a beautiful Princess. It had been foretold that she would one day marry a common soldier, and this so enraged the King that he locked her up in a great copper

palace, and allowed no one to visit her but himself and the Queen.

When the soldier heard this story he determined to see the beautiful Princess, come what may. So, summoning the dog with eyes as big as teacups, he bade him bring the Princess without delay.

The dog obeyed, and in a short time appeared with her fast asleep on his back. She was so wonderfully beautiful that the soldier bent over and kissed her gently, and then bade the dog take her safely back to the palace.

The next morning the Princess told the Queen that she had had a strange dream. She had dreamed she was riding on a huge dog, and was taken to a soldier who kissed her hand.

"A pretty dream, indeed," thought the Queen. "I'll find out where she goes."

That night she fastened a little bag of flour to the Princess's waist; but before she went away she took out her gold scissors, and made tiny holes in the bag, so that if she moved about the flour would drop out, and mark the road along which she travelled.

This is just what did happen. The soldier had fallen in love with the beautiful Princess, and that night he again sent the dog to bring her to him; and all the way along, as the dog ran from the soldier's house to the palace, the flour dropped out upon the roadway.

The next morning, when the Princess said: "I had that strange dream again last night, I wonder what it can mean," the Queen rose quickly, and went to the window from which she could see the roadway. And there, sure enough, was the little line of white.

Summoning her servants, she bade them follow that white line, and arrest the man to whose house it led; and so, before an hour had passed, the soldier was arrested and cast into prison.

The next day he was to be executed, and as he was sitting in his cell waiting for them to come for him, he thought how different things would have been if only he had had time to bring away his tinder-box. Just then his eye fell upon a little shoemaker's apprentice who was passing the window.

"Hi, boy!" he cried, starting up. "Fetch me my tinder-box, and I will give you a gold piece for your trouble."

Away ran the lad in great glee, and was soon back again with the magic box. From that moment the soldier knew his troubles were over. But he allowed the soldiers to lead him to the gibbet, and then when the King and Queen and the whole Court were assembled, amid a great crowd of people, to see the execution, just when, in fact, the executioner was on the point of fitting the rope round his neck, the soldier turned to the King, and said:

"Will it please your Majesty that I should smoke one pipe before I die?"

He spoke so courteously that the King consented; and then, in an instant, the soldier drew out the tinder-box. He struck it once, he struck it twice, he struck it three times, and suddenly all three dogs stood before him—the dog with eyes as big as teacups, the dog with eyes as big as mill-wheels, the dog with eyes as big as the Round Tower.

"Protect me! Protect me!" cried the soldier. "Don't let them hang me!"

Up sprang the three dogs, and in an instant there was a wild scene such as had never before been witnessed in that city. The dogs dashed in among the people, scattering them far and wide. The dog with eyes as big as the Round Tower flew at the King and Queen, and tossed them high into the air, so that their necks broke as they fell, and they were killed.

Then all the people shouted with one voice:

"We will have the soldier for our King. Set him on the throne, and put the gold crown upon his head. He shall marry our Princess, and rule over us."

They flocked to the gibbet and released their hero, while a party of soldiers marched to the copper palace to escort the lovely Princess to the heart of the city, where all the people eagerly awaited her. As the procession came in sight, they burst out into prolonged cheers, so that it was some time before the Lord High Chamberlain could make his voice heard. And when he announced that the Princess had consented to marry the soldier, they clapped their hands, and cheered till the streets echoed.

The next day there was a grand wedding. The soldier wedded the Princess, amid scenes of enthusiasm, and they lived happily together all their lives.

HOW GOTHAM GOT A BAD NAME

EVERYBODY has heard of the Wise Fools of Gotham. But perhaps we do not know who these men were, or where Gotham is, or exactly what is meant by calling them "Wise Fools."

This is the story: Gotham is a village in Nottinghamshire, and one day his Majesty King John of England, marching towards the town of Nottingham, commanded that his retinue should pass through Gotham meadow. Now, it was popularly thought that any land over which the King passed became ever after a public road; so the men of Gotham, who valued their meadow, took steps to prevent King John from crossing that way. The King, angered by their proceedings, sent his officers to conduct an inquiry in the village.

When the officers arrived, they found some of the men shouting and making a tremendous din over a pond. These noisy fellows had an eel on a string, and were trying, so they said, *to drown it in the pond!* Others were found rolling cheeses down the road—giving them a push and letting them bowl along of their own accord. They were sending their cheeses, they said, to Nottingham Market. Others, in a tremendous hurry, were dragging carts and waggons up a hill. They were going to shade a wood, they said, from the hot rays of the sun. And others were building a hedge round a bush on which a cuckoo had settled, to prevent the bird from flying away.

The officers went away half amused and half disgusted, and reported that Gotham was a village of fools utterly beneath the King's notice.

But others, who knew more of the story, said that there were some very wise fools in Gotham, and so the phrase came to signify folly which was put on for a wise purpose. It was really a compliment to Gotham, not a sneer. A charming old English writer, named Thomas Fuller, says: "Gotham doth breed as *wise* people as any which causelessly laugh at the simplicity."

LA JEUNE FÉE DU LAC VAN

THE ENGLISH VERSION OF THIS STORY IS GIVEN ON PAGE 2302

UN jeune berger de Mothvey gardait ses moutons, une après-midi, près du Lac Van, dans les Montagnes Noires du Pays de Galles, quand trois jeunes fées sortirent de l'eau et se mirent à jouer sur l'herbe. Toutes trois étaient belles d'une beauté surhumaine, mais la plus jeune était la plus adorable; et le berger tomba éperdûment amoureux d'elle et réussit à la faire consentir à devenir sa femme. La jour du mariage, la fée sortit du Lac Van apportant, en fait de dot, trois vaches, deux bœufs et un taureau, et la noce fut joyeusement célébrée à l'église de Mothvey.

"Et maintenant," dit la fée à son mari, "rappelez-vous que si vous me frappez trois fois sans raison, je serai obligée de retourner au Lac Van."

Le berger dit que jamais il ne ferait chose pareille, et ils vécurent heureux ensemble et eurent trois fils. Mais quand le berger pria sa femme d'aller chercher un cheval pour se rendre au baptême, elle oublia de le faire, et, sans penser à sa menace, son mari lui frappa l'épaule en lui disant de faire ce qu'il lui avait demandé.

"Une fois," dit la fée.

Bientôt après, ils allèrent à une noce et au lieu de s'amuser, la fée pleura tout le temps, comme si elle avait été à un enterrement, et tout le monde était attristé.

"Pourquoi pleurez-vous?" dit le berger en la frappant sur l'épaule.

"Parce que le mariage ne sera pas heureux," répondit-elle. "Et faites attention! Vous m'avez frappée deux fois déjà."

Le berger devint très prudent car il tenait à ne pas perdre sa femme, mais plus tard, à un enterrement, elle scandalisa tout le monde, en riant et en dansant. S'oubliant complètement, le berger la frappa en disant:

"Est-ce le moment de s'égayer?"

"Oui," dit-elle. "L'enfant a échappé aux douleurs de ce monde et est entré dans le Royaume des Cieux. Mais vous m'avez frappée trois fois. Adieu!"

Quand elle pénétra dans le Lac Van, ses bestiaux l'y suivirent. Cependant, quand ses trois fils furent grands, la fée réapparut et leur donna le pouvoir de guérir et ils devinrent tous trois de célèbres médecins.

THE NEXT STORIES ARE ON PAGE 4219

HOW WE GET KEROSENE

Unless your house is furnished with gas or electric lights, you probably have lamps which burn kerosene. The great majority of the people of the United States use the light of kerosene lamps, as gas and electricity are seldom supplied except in cities or towns.

What is kerosene

Now kerosene is only one of the products of petroleum. This word means "rock oil," and was once thought to be mineral in its nature. Now we know that it is closely connected with coal and is usually found in its neighbourhood. Petroleum has been known for hundreds of years, but it is only recently that kerosene came into use. Your grandfather can no doubt remember when it first was offered for sale.

The early explorers of what is now the United States found petroleum oozing out of the ground or floating on the surface of the water in several parts of the United States. They found that the Indians rubbed their bodies with it, and said that it made them active and quick. So when this country became settled the whites also began to use the oil.

How petroleum was first gotten

Sometimes they laid blankets on the ground where the oil appeared and then wrung it out of them. Sometimes they skimmed it off the surface of the water. The quantity they gained was small. It was then sold by pedlers at a high price, as Seneca Oil, Indian Oil or some such name. It was rubbed on the body as a cure for rheumatism, or taken as a medicine. Few families would use more than a pint in a year.

The men, boring wells to get salt water in Western Virginia in 1806, found much petroleum along with the brine. This caused a great deal of trouble here and at other places, but no one seemed to have thought of using it except as a liniment or as a medicine for many years. Finally in 1848 Samuel M. Kier had some of the thick substance distilled and secured an oil which would burn in a lamp, though it had a horrible odour. It was called carbon oil and sold for a dollar and a half a gallon.

Now people began to sink wells to get the petroleum, but the natural gas which sometimes appeared with the oil caught fire and caused an explosion. The oil was now sometimes used to make machinery run more smoothly, but still the business did not grow rapidly.

The first appearance of the word kerosene

In 1846 Dr. Abraham Gesner obtained an oil from coal which he afterwards called "kerosene," and a company was organised to manufacture it. The company was successful and other oil-works were established. The demand grew and Dr. Silliman, of Yale College, was employed to find out whether there was any likeness between coal-oil and petroleum. He conducted his experiments on Oil Creek in Pennsylvania and reported that petroleum furnished excellent oil for burning. A company had been organised to take the oil from a spring in 1854, and in 1856 it was determined to try the experiment of boring a well deep into the earth.

The company employed Edwin L. Drake to superintend the work. This man had been a railway conductor, who had resigned because of ill-health. A new company was organised, and, finally, in 1858, Colonel Drake, as he was called, though he had never been a soldier, arrived in Titusville, Pennsylvania, and tried to begin boring the well. Tools could not be had, and not until May, 1859, did work really commence. A tube was driven down to the rock and the workmen began to drill, accomplishing about three feet a day.

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How the first well was sunk

Money was scarce and at one time it was thought that work must be given up, but Colonel Drake was determined to go on and borrowed the money necessary to keep the drillers at work. On Saturday, August 28, 1859, the drill seemed to move easily just before the workmen stopped for the day. Sunday, one of them visited the well and found that it was nearly full of oil.

Towns in the oil regions spring up in a night

A pump was attached on Monday and the well was found to yield twenty barrels a day. The whole region went wild. Every foot of land along the creek was bought or leased by men who intended to drill for oil. Wells were sunk in every direction. The town grew in a few months from a few hundred to fifteen thousand. Many men grew rich almost at once. The news spread and men in other sections where oily springs had been found also sunk wells.

The last days of Colonel Drake

The Drake well did not last many years. Gradually the yield grew less and less, and finally gave out altogether. Colonel Drake had thought that it would be permanent and did not try to buy or lease other land. Finally he left the oil regions with $16,000, which he afterward lost, and for a time was very poor. When the men who had gained millions in the oil business heard of his poverty, they raised some money for him and the legislature of Pennsylvania voted $1,500 a year as long as he or his wife should live.

In other sections a different kind of oil was found. This was thick like molasses, and was used only to make machinery run more smoothly, and today the wells in the Franklin district send their oil over the world. A third kind of oil which could be used both for light and machinery was soon discovered. Some of the wells spouted oil. In all, hundreds of wells were sunk in the district, and oil was also found in West Virginia and Kentucky. Soon refineries were established to separate the oil into its different parts.

A match sometimes causes a fire

Many accidents occurred in the oil country in the early days. Much oil was wasted and ran out in the ground. Every building around an oil-well was saturated, and when a match was carelessly thrown down, sometimes a great fire occurred. Occasionally a tank was struck by lightning. We show you a picture of that accident. Now more care is taken and fewer accidents occur.

In later years oil has been found in many states. New York, Indiana, Illinois, Ohio, Kansas, California and Texas produce oil in large quantities.

"Torpedoing a well"

In the days when wells were drilled for salt water, it was found that by exploding powder in the bottom of the well, sometimes more water could be secured. The same experiment was tried with the oil-wells and was often successful. At first powder was used, but it was soon found that nitro-glycerine was better. This substance is a mixture of nitric and sulphuric acids, and glycerine, and is very powerful. A few drops will wreck a house if it is struck sharply. It does not always explode from fire. It is let down into a well and a little powder is put in a cap on top. Then a little iron weight is dropped. The explosion shatters the rocks in the bottom and cleans out the paraffine which had clogged the well. Sometimes wells which had before furnished only a few barrels a day, yielded hundreds after an explosion.

One trouble which developed was the cost of carrying the oil. The roads were bad and the teamsters charged high prices for carrying the oil. Then too the barrels were expensive and not many of them could be carried on the railway. So wooden tanks were built upon the cars, and then iron tanks like a boiler were built. Every stream in the oil region had a fleet of flat boats which carried oil to the market.

Sending oil to market under the ground

Only a year or two after the oil-wells were opened, a man thought of the plan of running the oil to market in a pipe. The teamsters, angry at seeing

EARLY DAYS IN THE OIL INDUSTRY

The Original Drake Well, First Oil Well in the World.

This man, Colonel Edwin L. Drake, drilled the first well for oil near Titusville, Pennsylvania, in 1859, and with this well, which you see to the right, the great American oil industry began. Before this time oil had been used chiefly for medicine or as a liniment, though a little had been used for lighting purposes.

Here is an oil well which has just had a charge of nitroglycerine exploded at the bottom. The picture to the right shows a burning oil-tank, which was struck by lightning. When a tank catches fire, it must burn until the oil is exhausted, as water only spreads the flames. Sometimes oil on the surface of water catches fire.

Pictures copyright by Keystone View Co.

their business broken up, destroyed the first pipes and sometimes there were riots. But the new plan saved so much expense that others were built and now there are thousands of miles of pipes running from the oil-wells to the refineries, or to the sea coast. Lines reach from the oil country to New York, Philadelphia, Baltimore, Cleveland, Buffalo and other cities. In all there are more than 25,000 miles of line.

Every few miles are powerful pumps which drive the oil onward. Sometimes the paraffine collects on the sides of the pipes and almost clogs them up. When this happens a little machine with sharp, revolving knives is put into the pipe. The pressure from behind pushes it along and the inside of the pipe is scraped clean. This is usually called a "go-devil."

In order to increase the flow of an oil-well, a charge of nitro-glycerine is often exploded at the bottom. Here we see the men pouring the fluid into a tin cylinder. It is then carefully let down to the bottom, and then a weight is dropped down the tube. The resulting explosion often sends a fountain of oil high into the air, as you can see in the picture on another page. Sometimes the flow is permanently increased, though often the greater production does not last long.

THE WONDERFUL PRODUCTS OF PETROLEUM

In the refineries the crude oil is treated. The crude oil from different wells is very different. Some will burn without refining, and some engines have been arranged to burn crude oil instead of coal. Other oils are valuable for oiling machinery, but all are improved by refining as many different substances are in the oil. Over two hundred different things have been gotten from the oil, and the chemists think they can separate many more. The kerosene for lamps and the machinery oil are the most important, but gasolene, for motor cars and gas engines, benzine, vaseline, are all products of crude oil. Then, too, soap, candles, chewing gum, lampblack, salves, and dozens of other things come out of the oil.

Photograph copyright by Keystone View Co.

AMERICAN ARMY UNDER WASHINGTON CROSSING THE DELAWARE RIVER

This picture by Emanuel Leutze represents Washington crossing the Delaware River to surprise the British army on Christmas night, 1776. Though the painting has serious faults, and is incorrect in many particulars, the spirit is fine, and can but increase the patriotism of American boys and girls.

GAMES TO PLAY IN THE HAY-FIELD

There are all sorts of games and competitions that can be played in the hay, and this picture shows us a new way of playing hide-and-seek. Some boys and girls bury themselves in a pile of hay, and then their companions have to identify them by the feet that remain sticking out.

It is much more difficult than we should think to guess the boys or girls by their feet. The little girl seen standing up, in this picture and the last, has given wrong guesses in nearly every case. She is very much surprised when the signal is given to sit up and show faces.

Three-legged races in the hay cause a great deal of fun and amusement. Here we see two pairs of partners, their legs tied together with handkerchiefs, ready for the signal to start. A good winning-post is a rake held up by the umpire as seen in the next picture.

The race is here shown in progress. There is no hard-and-fast rule as to how the players are to get to the winning-post, and we can see that while some are walking or running, others think that they can cover the ground more quickly by crawling along in the hay.

Another good form of race for the hay-field is a hopping race. The players stand in a row, and as soon as the signal is given they start off, and must hop all the way on one foot. If they put their second foot to the ground more than three times they are disqualified.

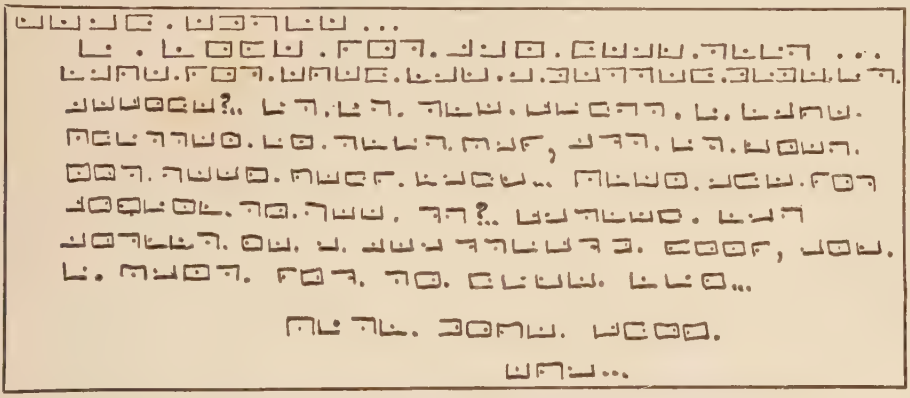
No hay-party is complete without a toy waggon to load up, and a vehicle like that shown in the picture can be easily made out of a long wooden box put on four wheels taken from an old barrow or perambulator. We can then take it in turn to ride upon the load of hay on the toy waggon.

CONTINUED FROM PAGE 4034

HOW TO KEEP A SECRET IN WRITING

IT is a wise and safe rule that if you want to keep a secret you must never write it down; but it is easy to write a secret so that nobody but yourself or your friend can read it.

Not many years ago, when a terrible thing happened in Russia, the Russian Government did not want the news of it to reach other countries, and they stopped all telegrams about it. But a clever journalist knew how to beat the Government, and he sent long telegrams to a merchant in Liverpool all about corn. It seemed very uninteresting and unimportant to the telegraph clerks in Russia, but when the merchant received the telegrams in Liverpool he knew that the Emperor of Russia was dead. The journalist had written his telegrams in a mystery-language which he and the merchant understood. You may make a mystery-language of your own. You have read of codes, and messages, and secret ciphers in times of war. A cipher is a way of writing, in any language, in such a way that even those who know the language cannot understand the writing unless they have the key which makes it clear. There are many simple ciphers which we can quickly learn; those used in time of war are, of course, very difficult.



This sentence would puzzle some boys and girls if they saw it in a book: "Ihopeyoucanreadthis," but it is really only six words joined together.

That is the simplest kind of cipher you can have, and not really a cipher at all. Here are some others, three letters written in different ciphers. The first looks like a Chinese puzzle, but the key will show you how easy it is.

Extraordinary as this seems, it is really very simple when you have the key to the cipher in which the letter is written. The alphabet is divided up so that it is possible to indicate the position of any one letter by a dot, as is seen here:

a b c	d e f	g h i
j k l	m n o	p q r
s t u	v w x	y z

You will notice that there are three letters of the alphabet in each space, except the last. To write the key, begin with the first letter in the first space, then write the alphabet *across* the rows of spaces. Next you must notice the position of each letter in each space; for instance, *a* is the *first* letter in the space marked by the lines ⌐⌐|. Thus, instead of writing *a*, you write . ⌐⌐|, being careful to place the dot in the *first position* in the space. In the same way *b* is written . |, where the dot is in the *second position.* The letter *d* is the first dot in the second space, thus: |. |, *e* is |. |, and so on for the remainder of the letters. Instead of using dots the figures 1, 2, 3 may mark positions, so that *a* would be 1 |, *b* 2 |, *c* 3|, and so on; but the dot system is better and more puzzling. When writing a letter in this way, remember to *put a full stop after each word* and *three stops at the end of each sentence.* Always take care that these stops come *outside* the space. The comma and other marks may be used as usual.

Now that you have the key you will be able to read the cipher letter which says:

DEAR ELSIE,

I hope you can read this. Have you ever had a letter like it before? It is the first I have written in this way, but it does not seem very hard. When are you coming to see us? Father has bought me a beautiful pony, and I want you to ride him. With love from EVA.

Here is another cipher—a letter in figures:

13.2.1.43— 2.51.1—
45.23.2— 21.3.43.44.45— 41.1.43.45—
4.21— 54.4.5.43— 33.2.45.45.2.43—
45.4.4.32— 34.2— 1— 33.4.35.22—
45.3.34.2— 45.4— 43.2.1.13, 11.5.45— 3—
44.4.4.35— 11.2.22.1.35— 45.4—
32.35.4.52— 45.23.2— 33.2.45.45.2.43.44—
52.3.45.23.4.5.45— 5.44.3.35.22—
45.23.2— 32.2.54... 3— 1.34—
12.4.34.3.35.22— 45.4— 44.2.2— 54.4.5—
3.35— 45.23.2— 23.4.33.3.13.1.54.44—
3.21— 3— 12.1.35...
52.3.45.23— 33.4.51.2— 21.43.4.34—
2.33.44.3.2.

To get the key of this cipher write out the alphabet in this way, numbering the five vowels in order :

a b c d e f g h i j k l m n o p q r s t u v w x y z.
1 2 3 4 5

Thus, a is 1 ; e is 2 ; i is 3 ; o is 4 ; u is 5.

To find any other letter, we must get first the number of the vowel before it, then count the number of letters after the vowel until we reach the letter we want. Thus, *b* comes after the *first* vowel, and is the first letter after it ; and instead of *b* we write 11—the first figure for the number of the vowel, the second for the number of the letter past the vowel. In the same way, *c* is 12—that is, the second letter past the first vowel ; *f* is 21—that is, the first letter after the second vowel. We must be very careful, of course, to put the number of the vowel in its proper place.

We can now write the whole alphabet in figures according to our cipher :

a, 1	e, 2	i, 3	m, 34	q, 42	u, 5	x, 53
b, 11	f, 21	j, 31	n, 35	r, 43	v, 51	y, 54
c, 12	g, 22	k, 32	o, 4	s, 44	w, 52	z, 55
d, 13	h, 23	l, 33	p, 41	t, 45		

In writing this cipher, *put a full stop after each letter*, and *a short line at the end of each word*. Finish a sentence with three full stops ; use commas and other stops as usual. You will now be able to read the figure-letter in ordinary writing. Here it is :

DEAR EVA,

The first part of your letter took me a long time to read, but I soon began to know the letters without using the key. I am coming to see you in the holidays if I can. With love from ELSIE.

The third cipher may seem more puzzling still at first sight, though it has a great drawback which may often destroy its value.

DEEEEAVARE EEELLESSEYEEE,

Doubleyouee aitchaydee essyousea-aitch effyouen ohveeeeare teaaitchee elleeteateaeeare wyohyou esseeentea. Jayayseakay teaaitcheyeenkayess wyohyouare seaeyepeaaitcheeare eyeess veeeearewy geeohohdee. Eye ayem jayyouesstea geeoheyeengee ohyoutea ohen emwy peaohenwy, essoh geeohohdee-bewyee.

Doubleyoueyeteaaitch ellohveeee effareohem EEVEEAY.

If you will read this letter aloud, the mystery will become clear to you. The secret of it is that every letter is *spelt*. Some letters of the alphabet can be spelt in more than one way, but it does not matter which we choose if we keep the same throughout our letter.

The key to our spelling here is :

a, ay	h, aitch	o, oh	u, you
b, be	i, eye	p, pea	v, vee
c, sea	j, jay	q, cue	w, doubleyou
d, dee	k, kay	r, are	x, ex
e, ee	l, ell	s, ess	y, wy
f, eff	m, em	t, tea	z, zed
g, gee	n, en		

In ordinary writing, the letter reads :

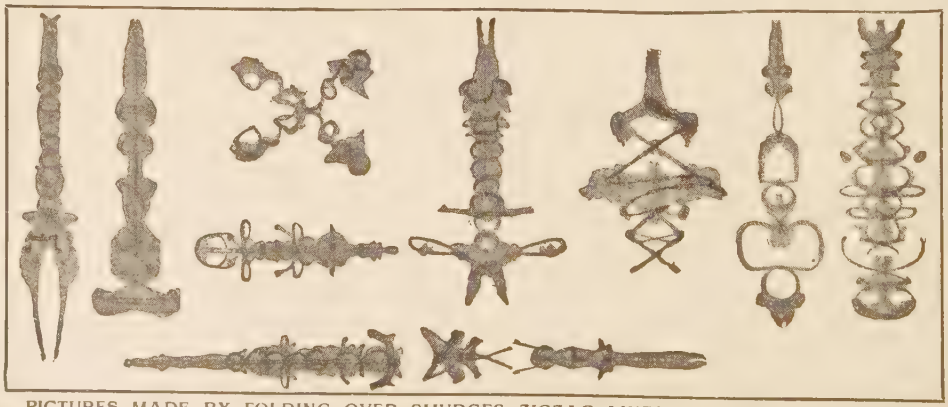
DEAR ELSIE,

We had such fun over the letter you sent. Jack thinks your cipher is very good. I am just going out on my pony, so good-bye. With love from EVA.

These examples of mystery-writing will give you great amusement if you practise them, and you will find that to invent new ciphers for yourself is very simple now that you have learned to understand these.

NAME-PICTURES AND HOW TO MAKE THEM

MAKING name-pictures, or "smudge-graphs," is a very pretty amusement. We want some paper, pens, and ink, and must sit up to the table. Dip the pen in the ink and scribble quickly a fairly thick zig-zag line on the paper ; then, before it gets dry, fold the paper over at the side of the scribbled line, and rub it down with the thumbnail. On opening it again, a pretty outline will be seen. Names or words may be written instead, and the paper folded just at the base of the letters. Quite pretty ornamentations can be made like this, even by people who are not able to draw. Fold the paper *first* and use the fold to write against, as you use the lines in exercise books. Sometimes better effects are got by folding the paper through the middle of the word instead of by the side of it.



PICTURES MADE BY FOLDING OVER SMUDGES, ZIGZAG LINES, CROSSES, AND NAMES

TRICKS WITH A SET OF DOMINOES

Most of us possess a box of dominoes, but few, probably, ever thought of using them for conjuring purposes. As a matter of fact, however, a set of dominoes, in the hands of a smart boy, will enable him to perform two or three capital tricks that will cause much wonder among the audience.

To begin with, he may invite someone to pick out any domino he pleases, and after noticing its points, hold it hidden in his hand. He is then to multiply the points at either end of the domino by two, add five to the product, multiply the total so obtained by five, and add the points at the opposite end. On his stating the final result, the young wizard will tell him what domino he chose.

In order to ascertain this, all he has to do is to subtract twenty-five from the number given him, when the remainder will consist of two figures, corresponding with the two ends of the domino. Thus, suppose that the points were six, three. Twice 6 are 12; 12 and 5 are 17, and 5 times 17 are 85. The addition of the 3 points at the other end of the domino brings the total up to 88. This is, therefore, the number which is told to the performer. Subtracting 25 from 88, the remainder is 63, the two digits, 6—3, supplying the desired answer. Whichever end of the domino we begin with, it comes to the same thing. Suppose we begin with the 3 instead of the 6. Twice 3 are 6; 6 and 5 are 11; 5 times 11 are 55, and 55 and 6 make 61. Twenty-five taken from 61 leave 36, again giving the points of the domino, but this time in the reverse order, 3—6.

1. The row of dominoes arranged ready for the trick to be performed

After repeating the trick once or twice, we proceed to a feat of a different kind. We lay fifteen of the dominoes in a row face downwards on the table, taking them apparently haphazard, but really choosing particular numbers, as follows: The first domino, at the left-hand end of the row, must be the double six; the next a six-five; the third either a six-four or a double five—either of these making a total of ten; the fourth a six-three or five-four—to make nine; the fifth any domino that will show a total of eight, and so on with dominoes making seven, six, five, four, three, two, and one respectively. The thirteenth domino must be the double blank, after which we complete the row with any two other dominoes we please. The fact that the dominoes are placed in this particular order is, of course, unknown to the spectators.

2. The row of dominoes as it appears after some have been moved

We now invite anyone to shift any number of the dominoes from the right to the left-hand end of the row. While he does so we leave the room, assuring him that though we cannot see what he does, we shall know, notwithstanding, how many dominoes he moves. On our return we say: "Yes, I can tell you how many you have moved. In fact, the dominoes shall tell you themselves. I will turn up the very domino giving the correct answer." We turn up one domino, and its points are found exactly to agree with the number that has been shifted.

As a matter of fact, we do not ourselves know the number moved, but we must not let the audience suspect this. The secret lies in the fact that *the third domino from the right-hand end of the row* will always be the same as the number moved. Let us take an example. Say that the dominoes, or stones, as they are called, are, at starting, as shown in our first picture, save that they will be faces down instead of up. Suppose that three are shifted. The row as thereby altered will be as in our second picture. We can see that the third from the right is the two-one, representing three. If four stones had been moved, the third from the right would have been a four, and so on. By way of a third trick we may challenge anyone to arrange the whole of the stones in proper domino fashion; six against six, five against five, and so on. We show in the first place, by doing it, that it can be done. "It looks easy, doesn't it?" we remark. "But now I shall put a spell upon the dominoes, and while the charm lasts nobody but myself can do it." We mix up the stones, and now anyone may try, but he will try in vain.

The secret in this case is that in shuffling the dominoes we privately take away any two of them, *all four ends of which are different*, when the rest can no longer be arranged in a continuous row.

To conclude, we again wave our hand over the dominoes, and secretly put back one of those taken away. "Now," we say, "I will take off the charm, and you will find that you can arrange the dominoes quite easily. While you do so, I will leave the room. When you have finished, cover the dominoes over with a handkerchief, and I will tell you, without seeing them, the number at each end of the row." Which you do accordingly.

Here, again, the solution is simple enough. A complete set of dominoes, twenty-eight in number, may be arranged domino fashion in a complete circle or chain. If we remove any one stone, not being a double, there will be a break in the chain, and the numbers on each side of the break will be the same as those of the stone we removed. For instance, if we have abstracted a five-three, the number at the one end of the row will be a five, and the number at the other end a three. Whether the stones are actually arranged in a circle or in a straight line makes no difference. These are a few of the tricks that it is possible to do with dominoes, which may be made extremely interesting.

HOW TO MAKE PAPER FLOWERS

Paper flowers are easily made at very little cost, and if they are well modelled, and the coloured paper of which they are made is carefully chosen, it is difficult to distinguish them from the flowers they represent.

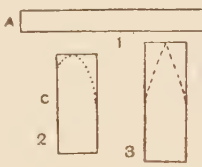
Artificial flowers are very useful for table decoration ; they can be used with excellent effect as sprays for lamp-shades, and, of course, they are always in great demand at bazaars.

ROSES

Let us first consider roses, for which we need only some coloured paper and a little wire. Any stationer will supply us with coloured crêpe paper at 10c. a roll, and we can buy a reel of fine wire from a florist's.

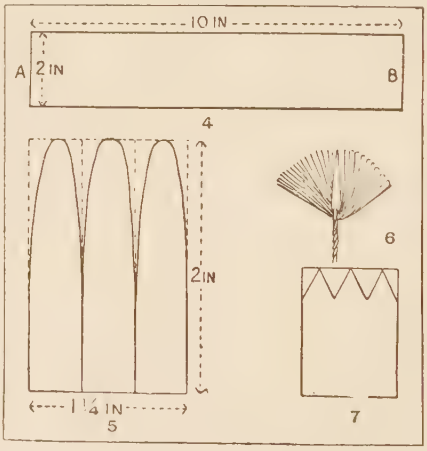
Take a strip of coloured crêpe paper—red or pink or yellow—about thirty inches long and three inches wide. Fold it in half, as from A to B in picture 1, again fold in half in the same direction, then fold it in three equal parts, and once again into two equal parts. If we count, we shall find that the paper is now twenty-four thicknesses.

Take a pencil and mark as shown by dotted line in picture 2, taking care that the folded side, and not the outside edges, is in the position of C. Cut round this line with scissors and open out the paper, which will now show twelve petals. Now with one of the blades of the scissors we must *curl the edges of each petal.* To do this, hold the paper in the left hand, and with the scissors between the thumb and first finger of the right hand gently pass the blade under the petal, first curling the right side and then the left, but always curling in the same direction. Now gather the first four petals closely together and gradually gather the others round and round these.



How to fold the paper in making the rose

Next we must make the *calyx* of the rose—that is, the little green leaves forming a cup at the base of the flower-head. Take a piece of green crêpe paper, three inches by two inches, fold it in half and then in the same direction into three equal parts. Cut as shown by dotted line in picture 3. This makes six points when opened out ; cut off one, as we require only five ; wrap the calyx round the outside rose-leaves and fasten with a small piece of wire. All that remains to be made now is the flower-stalk. Take a strip of green crêpe paper, seven or eight inches long and half an inch wide, and a piece of wire four and a half inches in length. Cover the wire with the green, holding the paper in a slanting direction in the left hand and gradually turning the wire with the right hand until covered. Double up one end of the stalk for about an eighth of an inch, and fasten the other end to the flower-head, and our flower is quite complete. Leaves for the rose can be bought at the shops quite cheaply.



How to fold the paper for the marguerite

CHRYSANTHEMUMS

To make a chrysanthemum we must take a piece of yellow tissue-paper forty inches long and five inches wide ; fold it in half lengthways—that is to make a double strip forty inches long and two and a half inches wide ; then with a pair of scissors cut a fringe about one and a quarter inch deep right along the strip, beginning from the folded side, not the outside edges.

Now hold the paper in the left hand, and with the right hand take the end of the paper and wind round and round as explained above. Prepare the stalk as is shown in making the paper rose, and fasten it very firmly round the base of the flower.

YELLOW MARGUERITES

Marguerites are not quite so easy to make. Take a strip of yellow tissue-paper, ten inches long and two inches wide ; fold in half, as from A to B in picture 4 ; fold again in the same direction, and still again, making the paper eight thicknesses.

Now take a pencil and draw three petals as shown in picture 5. Cut with scissors and open out paper, which will now show twenty-four petals.

We have now to make the centre of the marguerite, for which we must get some yellow crewel wool, a few shades deeper in colour than the paper ; about three yards will be sufficient. Wind this round three fingers of the left hand, and fasten a small piece of wire round the centre of the loops, leaving a small end as shown in picture 6. Bring the ends of the wool together and then cut the edges.

Next take a piece of green paper, three inches long and one inch wide, to make the calyx of the flower. Fold this in half ; again fold in half, and cut out three peaks, as shown in picture 7.

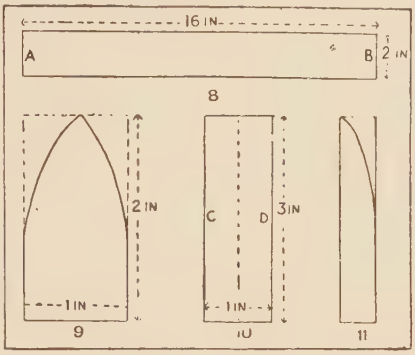
Now take the long strip of yellow paper, double it, and gather the petals round the wool centre ; wrap the green calyx outside this, and fasten with the end of the wire stalk, which should previously have been covered with green crêpe paper, as explained in making the paper rose. Arrange the petals carefully with the fingers, and the flower is finished.

This flower needs a little practice to make, but the result will amply repay the worker.

DOUBLE YELLOW DAFFODILS

We are now going to make a double daffodil. Cut a strip of yellow tissue-paper, sixteen inches long and two inches wide, and fold in half, as from A to B in picture 8 ; fold again three times in the same way, making the strip sixteen thicknesses. Take a pencil and mark the outline of petal as in picture 9. Cut with scissors, open out the paper, and curl the edges of each petal slightly by holding one of the blades of the scissors between the thumb and first finger of the right hand, and gently passing underneath the paper petal.

Now take a strip of paler coloured yellow paper, six inches long and two and a half inches deep, and fold into eight pieces—that is, by folding in half three times ; mark and cut outline of petal as shown in picture 9.



How to fold the paper for the daffodil

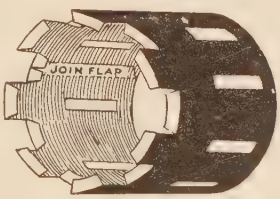
Gather the first four petals of the sixteen-inch strip together, and arrange the other petals round them ; then take the paler coloured piece and gather round this, and fasten all securely together with the end of the green covered wire stalk. Have you ever noticed that in the daffodil there is always a little brown, dried-up-looking leaf growing near the flower-head? We have now to make this little leaf from a small piece of light brown tissue-paper, one inch across and three inches deep. Fold it in half, as from C to D in picture 10, and cut as marked in picture 11, beginning to cut from the outside edges. Open out the leaf and fasten with some green covered wire to the stalk a little way below the flower-head.

All that we now require is just a few green leaves to arrange with our daffodils. These are easily made from a strip of green crêpe paper seven inches long and one inch wide, folded and cut in exactly the same way as we have just done for the brown leaf that is shown in picture 11.

If we have followed these instructions intelligently, we shall have no difficulty in copying any other flower that pleases our fancy.

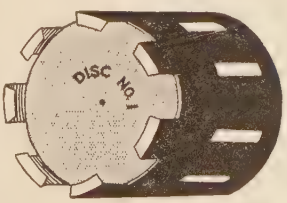
A SIMPLE TOY KINETOSCOPE

THERE is science in everything, and to understand properly even the most simple things, we must understand the science of them. We have learned in other parts of THE BOOK OF KNOWLEDGE something about the wonderful thing we know as light, and something about our own eyes, which are useful to us only because they are capable of being influenced by light. In this article we can see how to make an interesting toy that will bring home to us clearly the meaning of one of the properties of light, and of the powers of our own eyes. We shall make a little toy kinetoscope.



1. First stage

On the next page we shall find a large black picture, which is No. 4 of the pictures belonging to this article. We first draw this the same size as given in the picture, upon a piece of cardboard—not too thick, but yet not too thin. We can trace it on the card instead of copying it, and on page 445 the makers of Modeltown saw how to trace things on paper, so that we can turn back to that page if we find we require to learn the way to trace. Then we cut the drawing out of the card, using a sharp knife for preference, and being careful to cut out the seven slots very neatly and uniformly. With ink we make the back of the card completely black. When we have done this, we fold the card round to the form of a circle, and glue or gum the white edge under the opposite end, when it will be as seen in picture 1. Now we fold in the toes, of which there are two rows, towards the inside of the circle. They are shown so folded in picture 1. Now we copy picture 6 upon card, making our drawing the same size as given in the picture, and cut it out neatly. There is a tiny white spot in the middle of the picture. We must make this a tiny round hole, being careful not to make it too large. We do not require to make the back of the disc black. Glue it to the short toes of the first piece ; it will be found to fit exactly. Let the black side of this disc be away from the long toes and towards the slots. When we have proceeded so far, our toy will look like picture 2.

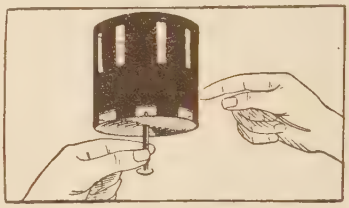


2. Second stage

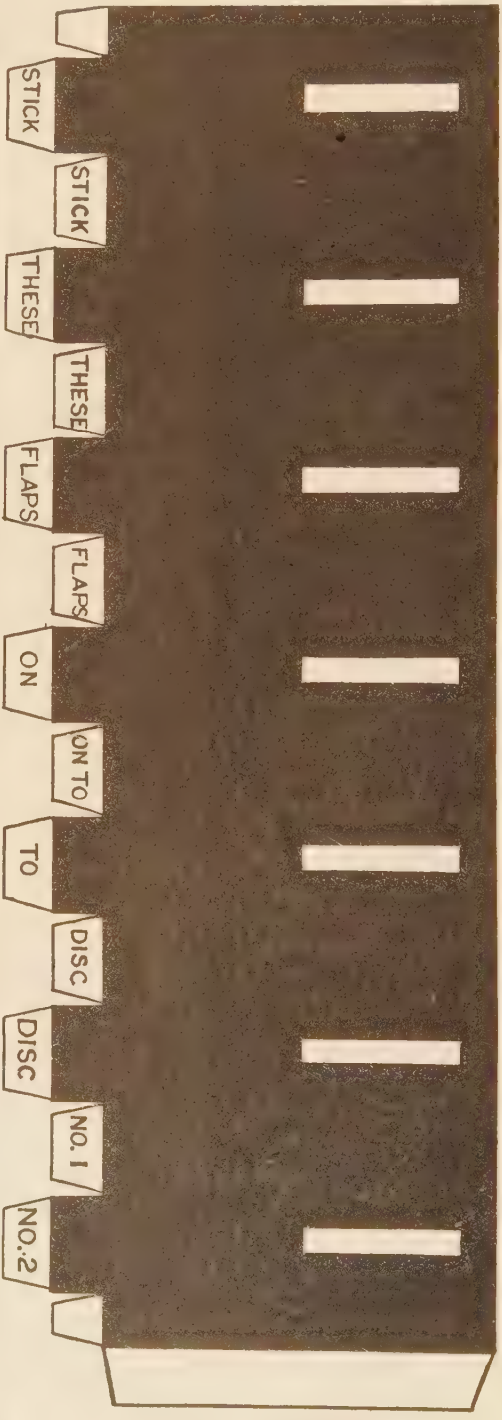
3. Third stage

Now we draw upon our card and cut out the second disc, which is shown in picture 7. Observe that the hole in it is larger than the hole in the first disc. It must be neatly made if we would have our toy work properly.

We glue the second disc to the long toes, and after we have done that our toy will look like picture 3. Our kinetoscope is now made; we have now to make only the pictures for it. In picture 8 appear four strips, each strip consisting of a series of tiny pictures. We draw one or all of these strips upon paper, not upon card — tracing them if we like. Having done this, we cut out each strip. Put one strip inside the toy we have made, round the inside wall just under the slots, or windows, with the picture side facing inwards towards the centre. Now get a round wire nail large enough to go into the hole of the bottom disc, so that its point will just go into, but not through, the hole in the upper disc. Then, in a good light, spin the toy with the finger, as seen in picture 5, and we shall seem to see movement inside the kinetoscope if we look through the



5. Spinning the kinetoscope



4. The body of the kinetoscope

6. Upper disc of kinetoscope

7. Lower disc of kinetoscope

Here are four strips of pictures which may be traced upon paper and used with the toy kinetoscope

windows. The clown will seem to turn a somersault upon a galloping horse, the dog will seem to leap over the stick, the ball will seem to be thrown from the hand, or the little girl will seem to play at skipping rope.

We ought to know the reason why these things seem to happen. It is that the pictures are white and everything else in the kinetoscope is black. Our eyes see white objects just a very little time longer than these objects are in front of them, and before the impression has faded, one picture has been succeeded by another, so that we seem to see not a succession of pictures, but a picture in motion. This is the same principle as the cinematograph or bioscope.

GAMES FOR OUT OF DOORS AND INDOORS

A BUNDLE OF RAGS

Two players stand opposite each other, and, clasping hands, sway backwards and forwards, singing at the same time :

"Draw a pail of water
For the miller's daughter.
One rush, two rush,
Pray, young lady, pop under the bush."

At the last word they lift their arms, but do not loose hands ; and the other players run under one by one. While this is being done, the first two players repeat the words again and again, and each time the last line is reached, they may, if they choose, try to catch whoever is passing under at that moment. If they succeed, all three jump together as high as they can, singing out :

"A bundle of rags, a bundle of rags,
Shake, shake together."

When all the players have been caught, the game may be repeated as before.

FIRE ON THE MOUNTAIN

In this game there are two rings of players, one outside the other. The players forming the inner ring sit or kneel down ; those in the outer ring stand close behind them, though there should be a good wide space between the two rings. A single player stands in the centre and presently calls out, "Fire on the mountain ! Run, run, run !" Those on the outside then gallop round as fast as they can, the rest sitting still, and the running is continued till the one in the centre cries, "Stop !" Then everybody, including the single player, tries to find a place behind one of the inner ring, and the boy or girl who is left out must take his or her turn in the centre.

FORFEIT-IN-THE-RING

A circle is formed by all but one of the players joining hands. This one walks round and round with a knotted handkerchief in his or her hand, and, in passing, hits each player lightly on the back, repeating the words, "Not you, not you, not you"—"but *you*." With these last words the handkerchief is dropped at the feet of the person referred to, who snatches it up and gives chase. When caught, the first player is brought back, and both, kneeling in the centre of the circle, pay a forfeit. The player at whose feet the handkerchief was dropped then goes round and round in turn, while the other takes his or her place in the ring.

HOW MANY MILES TO BABYLON?

All the players stand in a line side by side, holding hands, the two tallest players being at one end. These two hold their clasped hands high up in the form of an arch, or "gate," but without breaking from the line. Then the other players march forward, bending their line into a curve till the end one has reached the arch, when she stops.

"How many miles to Babylon?" she asks.

"Three score and ten," reply the two players who have their hands raised to form the gate.

"Shall we get there by candle-light?" inquires the leader.

"Yes, and back again."

"Then open your gates and let us through."

When this is done, the line passes under the arch till all are through, when the "gates" quickly loose hands and give chase, catching as many players as they can.

FOX AND CHICKENS

One player is the hen, and with all her chicks around her she goes clucking here and there, till suddenly they see another player, who is the fox, busily "picking up sticks."

"What do you want those sticks for?" says Mrs. Hen.

"To make a fire with," replies the fox.

"And what do you want a fire for?"

"To cook my supper."

"And what are you going to have for supper?"

"A chicken !" cries the fox, jumping up.

At these words all the chickens form a line one behind the other, holding each other by the waist, while the first in the row holds tightly to Mrs. Hen. Mrs. Hen spreads out her arms to stop the fox getting by, but if he does so, and steals one of the chickens, that chicken must stand behind him while he tries to get another ; and the game goes on till Mrs. Hen has no chickens left.

ORANGES AND LEMONS

The two tallest players stand opposite each other with their clasped hands held up to make an arch. One of these players is Orange and the other Lemon, but the rest of the players are not allowed to know which is which. A line is then formed in single file, and as it passes under the arch, Orange and Lemon sing these words :

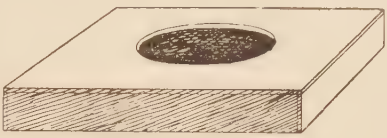
"Oranges and lemons,
Say the bells of St. Clement's ;
You owe me five farthings,
Say the bells of St. Martin's ;
When will you pay me ?
Say the bells of Old Bailey ;
When I grow rich,
Say the bells of Shoreditch ;
When will that be ?
Say the bells of Stepney ;
I'm sure I don't know,
Says the Great Bell of Bow.
Here comes a light to light you to bed ;
Here comes a chopper to chop off your head."

With the last words the arch descends on the player who is passing beneath, and she is a prisoner. She is then asked in a whisper if she will be an orange or a lemon, and when she has replied in a whisper, is sent to stand behind the one chosen. The march now begins again ; and when, one by one, all in the line have been served in this way, a mark is made in the grass or the floor, and all the oranges, holding to each other from behind, pull against all the lemons. The side that succeeds in dragging the other over the mark on the floor or grass wins the game.

KEEPING A FRESH-WATER AQUARIUM

THERE are few hobbies or amusements more fascinating than the keeping of an aquarium, which has the advantages of being amusing and instructive, and at the same time it is quite inexpensive. First of all there is the tank, and as it is very difficult for an amateur to make one so that the joints shall be quite watertight, we shall find it much better to get one ready made. The best shape is oblong, and one may often be picked up for a dollar or two at a second-hand furniture shop. We should see, before buying, that the tank is not leaky.

But if such a tank is not available, we may use almost any kind of glass vessel. A very serviceable aquarium can be made out of a gardener's propagating glass, inverted, and placed in a round hole cut into a small stool; or the bottom of a wooden box, turned upside down to receive it, will do, as shown in the pictures on this page. The aquarium must be placed where it can receive the light without standing in direct sunlight, and a room with a window facing north is very suitable for this purpose. In Nature, as we know, light always enters from the top of a pond or river, and so it is as well to have green cloth blinds or cardboard screens round an aquarium when we are not examining it, so that it may be as near to Nature as possible.



Stand for the aquarium

Having purchased an aquarium, we must fill it with water, and for this purpose water from a stream or a clean pond is the best, though, if this is lacking, tap water may be used. Next we must get some pebbles or gravel—not sand—for the bottom of the aquarium, and it is better to boil this before putting it in, so as to get rid of all possible impurity.

Then comes the stocking of the aquarium. First of all, we should provide some place of retreat for the inmates. A quantity of willow moss or water soldier placed at the bottom will be very useful for this purpose. It is much better to have no rockwork in a fresh-water aquarium. We should have some aquatic weed, which would give out oxygen, and absorb the carbonic acid given off by the fish, and Canadian pond weed, found in most ponds and rivers, will serve us well in this way. If we have a sufficient quantity of this weed, the water very rarely wants changing; all we have to do is to add a little fresh water from time to time, as evaporation takes place.

Scavengers are needed in an aquarium just as they are in a pond, and so we must place a few water snails in the water. These will eat up any decaying leaves and keep the inside of the glass clean. They also supply the fish with eggs for food, and here it must be distinctly understood that fish in an aquarium *do* need food. Many an inmate of an aquarium has been starved to death, because the owner thought that all the food the fish required was contained in the water.

But where the water was obtained from the tap in the first place, it has no food at all in it, and, even if it is pond water, the stock of food needs supplementing with crushed vermicelli and the so-called ant-eggs. Another useful scavenger, which multiplies at a great rate and provides food for the fish, is the fresh-water louse. It is to be obtained by pulling up weeds from a pond, and picking the creatures out of the mud round the roots. Now we come to the fish themselves, and here again let us remember to keep as close to Nature as possible. Our aquarium has stagnant water, therefore we should obtain our fish from standing ponds and not from running streams. Members of the carp or minnow families are the most suitable, and if we cannot find these in ponds, we can obtain them from naturalists' shops for quite a small amount, some of the fish not costing more than a few cents each.

The common goldfish is the most familiar inmate of our aquariums, and its fine metallic lustre gives it a very beautiful appearance. The Prussian carp, the common carp—greyish brown in colour, with barbels adorning its upper lip—the mirror carp, and the leather carp, are all easily obtained and easily kept. Of tench, the common or green tench is suitable, although it feeds by night and is very fond of concealing itself among the weeds in the aquarium. The golden tench gives a pleasant variety to the aquarium, its lighter yellow contrasting with the deep red-gold of the golden carp. One or two fish should be introduced at first, and if these thrive, then more may be added; but an aquarium must never be overcrowded, or disaster will follow. If the fish swim along the surface of the water tail downwards, it is a sure sign that they are being suffocated. And here we should know that the wider the mouth of the glass which we use for an aquarium, the better, for the greater will be the surface of water in contact with the atmosphere.

The home-made aquarium completed

Absolute cleanliness is essential in the keeping of an aquarium, and any decaying matter must be removed at once, or the fish will die. Remove also at once any unused food after feeding. A fungus disease frequently attacks goldfish in aquariums that are not kept perfectly clean. When this disease appears, all dead and infected fish must be at once removed, and the aquarium thoroughly disinfected with permanganate of potash solution, being well washed in clean water afterwards.

It is well to keep dust out of the water as much as possible, and to do this a round plate of glass may be placed over the aquarium like a lid, being raised from the vessel by being made to rest on two pieces of wood laid across the aquarium. This plan enables the air to get to the water without the slightest difficulty.

Great care must be exercised not to handle the fish in any way, and should it become necessary to remove them from the aquarium, this must be done by means of a net, another vessel containing water being ready for their reception. A suitable net may be bought for a dime or two; but this is not necessary, as one to serve the purpose can be made by making a circle of wire and fixing this to a cane, a bag of gauze or fine network being sewn round the wire circle.

If it becomes necessary to cleanse the aquarium owing to a green coating of vegetable matter obscuring the glass, the fish must first of all be removed in the manner described, and then the water can be drawn off by means of a syphon, which is a bent tube with one end larger than the other. It is used in the manner described on page 580. The water being removed, the green coating on the glass can be removed by rubbing it with a sponge, the sponge being frequently rinsed in clean water during the process.

It is well to aerate the water from time to time, and this may be done quite easily and effectively by pumping air into the water with an ordinary syringe or with a pair of bellows connected with a piece of india-rubber tubing leading into the water of the aquarium.

THE PUZZLE OF THE TREES IN THE PARK

A GENTLEMAN who had a fine park found one day that a storm during the previous night had blown down a number of his trees, and so he telegraphed to a nurseryman to send down twenty-four young trees that might be planted in place of those which had been destroyed.

When the trees came, the gentleman told his gardener that he wanted the twenty-four trees planted in such a way that there would be twenty-eight rows, each containing four trees in a straight line. The gardener thought the gentleman had made a mistake in the number of rows, so he asked him again how the trees were to be planted. The gentleman repeated that he wanted twenty-eight rows of four trees each, and the gardener told his master that this was impossible with twenty-four trees.

"Come into my study," said the gentleman, "and I will draw a plan for you, and you will see exactly how I want the trees to stand. It is quite easy to get twenty-eight rows with only four trees in each row."

The gardener followed the gentleman to the study, and in a moment or two the gentleman had drawn his plan, when the gardener owned that the task which at first had seemed quite impossible to him was very plain and simple. How were the trees planted? The gentleman's plan showing the twenty-eight rows is given on page 4250.

THE PROBLEM OF THE TRAVELLER'S DINNER

A LONG time ago two Arabs, who were travelling to Baghdad, stopped at a small village for their midday meal. One of them had five loaves with him and the other only three. Just as they were about to begin eating, a stranger came up, and, saying that he had money but no food, asked if he might share their meal. He promised to pay for what he had, and so the two travellers agreed to divide the loaves equally among the three, and invited him to sit down.

After the meal was over and all the food had been eaten, the stranger laid down eight coins of equal value in payment for the food he had eaten, and, bidding his hosts good-bye, went away. The traveller who had five loaves took up five of the coins as his share, and left three for the man who had had three loaves. But this man disputed the division of the money, and insisted that he should receive half of it.

The men began to quarrel very bitterly, and as they could not agree they went before the magistrate, so that he could decide who was right. The magistrate listened attentively to the story which the men had to tell, and then, to the astonishment of both, and of the people standing by, he said: "Let the man who had five loaves take seven of the coins and the man who had three take only one; that will be a fair division of the money." Was he right? The explanation which he gave will be found on page 4250.

THE NEXT THINGS TO MAKE AND THINGS TO DO BEGIN ON PAGE 4243

PAINTERS OF THE UNITED STATES

PIONEER PAINTERS

THE people who settled our country had fled away from home, trying to live as they thought best and right. They were far too busy, clearing the wilderness, making new homes and protecting these from wild beasts and wild Indians to think about art. They seldom saw a picture. Indeed the old Puritans were inclined to condemn the beautifying of life by art and music, as wrongful waste of time. But when their early difficulties were over and life easier, they became less severe. A few paintings gradually found their way across the seas, mostly to the stately homes of rich Southerners. But there was little or no American art until the middle of the eighteenth century. As is always the case, when life became so civilised that it no longer took all a man's energy to provide for the needs of his body, he felt stirred to desire higher interests, art and literature and music.

Our first artists knew little of any pictures except those of Mother England which were mostly portraits. So our first pictures are all portraits. The austere leading citizens of New England, the ministers and lawyers and merchants, developed great liking for having their pictures made.

A certain Swede — Gustavus Hesselius — is said to have been the first painter in this country.

OUR EARLY PORTRAIT-PAINTERS

Our first important American painter was Benjamin West, born of Quaker parents near Philadelphia, in 1738. He had no early training, but fascinated by the colours, the vivid reds, blues and yellows with which the Indians painted their bodies, he taught himself much by experimenting with these. A gentleman interested in the boy's efforts, gave him a paint box and very soon he was successfully painting portraits. When he was twenty-one another friend sent him to Rome and from then on he won great success. Much of his life was passed in London, where he was knighted, became very popular, and where he succeeded Sir Joshua Reynolds as President of the Royal Academy. He had the kindest feeling for needy art students and helped many a talented young American. He died in London in 1820, and was buried in St. Paul's Cathedral with impressive ceremony.

His work, once so greatly admired, looks somewhat hard and out of drawing to the modern critic. But he deserves to be remembered because his pictures show imagination, something more than merely faithful copying of the sitter's outward aspect, and because he pointed the way to others of greater talent.

John Singleton Copley is one of the most illustrious of our early painters. His parents were Irish, and his father was a tobacconist in Boston when the artist was born in 1737. Soon after, his father died, and later his mother married Peter Pelham, a painter and engraver, who gave his stepson valuable training. For a time Copley worked at engraving but soon took to portrait-painting. His subjects were the aristocrats of the New World, men and women of character and culture, and he was especially successful in conveying a sense of dignity and personal distinction. One of his best known portraits is that of Lady Wentworth, then a Boston belle of nineteen.

Copley himself, handsome, clever in conversation, of delightful manners, was a great favourite in New England society. When thirty-two he married Miss Clark, the daughter of a wealthy merchant, the very man to whom was consigned the famous cargo of tea flung into Boston Harbour a few years later. Our early artists, however successful,

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felt the lack of artistic atmosphere. They longed to study the pictures of the old world. At the height of his success, Copley went to Rome and later to London, where he was welcomed by West and remained until his death. His son became Lord Chancellor of England.

Philadelphia has the distinction of being our earliest art centre. At the dawn of the Revolution it was our biggest city, as well as the richest and most fashionable. From early days Philadelphia had been rather more liberal-minded toward the arts than severe New England. Perhaps the most famous of early Philadelphia painters was Charles Willson Peale. Like many another American artist he began as an artistic craftsman. He became an expert worker in wood, leather and metal. Then the Swedish painter, Hesselius, gave him drawing lessons and he decided to be an artist. He went to Boston to study with Copley and then to London where he studied with Benjamin West. He then returned to this country, where his first important work was a life-size portrait of George Washington in the striking blue and scarlet uniform of a Virginia colonel.

Peale himself became a soldier of the Revolution and fought bravely in the battles of Trenton and Germantown. He began his second portrait of Washington, — a commission from Congress, — in 1777, during the dreary waiting at Valley Forge. He painted fourteen portraits of Washington, and the portraits also of many other distinguished men. Peale deserves to be remembered for other services to American art. He organised the first exhibition of paintings ever held in this country and was one of the founders of the Pennsylvania Academy of Art.

Gilbert Stuart, another painter of lasting fame, was one of the first to paint with individuality. The son of a Scotch refugee and a Welshwoman, he was born at Narragansett in 1755 and showed his talent for drawing as a child. He was eighteen when a Scotch artist, visiting in this country, gave him lessons, and invited him to go back to Scotland with him. Young Stuart was placed in the University of Glasgow, but his protector died, and the boy, poor and homesick, was glad to make his way home on a collier. His family were Tories, and at the outbreak of the Revolution, he fled to London. There he was befriended by West, who took him as assistant, for which position, however, he was too independent in ideas and methods. He formed his own theories of painting and was perhaps the first to present his subjects as he saw them with freedom and naturalness, until then unknown. His work marks a great gain in lifelikeness and sincerity.

Among his most famous portraits are those of Dr. Fothergill, a distinguished Quaker physician, and the one of George Washington known as the Athenaeum Portrait, now hanging in the Museum of Fine Arts in Boston. Stuart lived in Boston from 1794 until his death in 1828.

Painters of History

When the great struggle of the Revolution ended, the spirit of patriotism, which had been kindled and strengthened by sufferings endured, found expression in art. Our artists were no longer satisfied to paint only portraits. Henceforth we have pictures representing historic and stirring scenes.

John Trumbull has been called the connecting link between the early portrait painters and the painters of landscape. Born in Lebanon, Conn., the son of a Colonial Governor, and graduated at Harvard, he fell under the best educative influence of his day. As a mere boy, he joined the Revolutionary army and was soon making himself useful to Washington by his skilful drawing of the enemy's works. He resigned from the army, went to France, then to London, where he too studied under West. He had a hard experience, for the English Government, indignant at the execution of Major André, threw him into prison for eight months and then ordered him out of the country.

The very stirring history then in the making, fired his imagination to paint great historical scenes such as The Battle of Bunker Hill. How highly esteemed Trumbull was in his day may be seen by the fact that Congress com-

missioned him to paint four paintings for the Capitol, for which $32,000 was appropriated, a far greater sum in those days than now.

In studying the development of American painting, it is wonderfully interesting to see how with growing powers and growing opportunities, and also as the public developed artistic understanding, our artists reached out to fuller and more varied forms of expression.

Washington Allston was one of the first to develop real sense of colour. He was one of the few Southern early American artists and was born in South Carolina in 1779. But he was educated north, at Newport, R. I., and then at Harvard. His boyhood's friend was Edward Malbone, who became a miniature painter of note and died prematurely.

Allston had the advantage of four years' study in Rome, where he enjoyed the companionship of many distinguished people, among them Keats, Shelley, Byron, and Turner. The life in Rome kindled his imagination, stimulated him, the critics say, to attempt more than his talent could perform. The Dead Man Restored to Life is one of his best known pictures. Even if his achievement was not great, as a man of high ideals and thorough education in art he favourably influenced American Art.

Before they had gone very far, American artists felt the need of banding together for enlightenment and encouragement. The very earliest Academy of Fine Arts, that of New York, founded in 1801, was soon discontinued for lack of money to support it. The next, that of Philadelphia, is still enjoying an honourable life. In 1870, Boston incorporated its Museum of Fine Arts. The very next year the New York Legislature granted a charter to the Metropolitan Museum of Art and later the city made an appropriation for the Museum Building in Central Park. The more the people saw pictures, the more they loved them and wanted to own them.

THE HUDSON RIVER SCHOOL

As the number of our artists multiplied they sought helpful intercourse with each other. A group of painters who lived and worked along the Hudson in the early nineteenth century has been given the name of the Hudson River School.

Of these one of the earliest and most famous was Thomas Cole. He was born in England, the son of a wall-paper maker and came to this country with his family when nineteen. He first studied art at the Philadelphia Academy. From there he went to New York and then sketched and painted along the Hudson and in the Catskill Mountains until his work attracted the attention of the artists Trumbull and Durand. For a time Cole was very successful. He travelled abroad and his work was exhibited in the Royal Academy. He painted great series of pictures in which his romantic imagination took the scenes among which he lived and made them the setting for a poetic allegory. One of these was The Voyage of Life. Another, The Course of Empire. They have a kind of story charm and are impressive from their very bigness. There is much beauty and feeling in the landscape part, but gifted though Cole unquestionably was, his style has long been obsolete.

Our artists were discovering how great and full of resources our young country was. We were proud of its bigness. The artists of the day sought great subjects. One of Albert Bierstadt's most famous paintings is the Yosemite Valley. Thomas Moran revealed the Rocky Mountains to the stay-at-home public, while F. E. Church painted Cotopaxi. From Trumbull's day we have had painters of historical scenes. Emanuel Leutze's present claim to remembrance rests chiefly on his historical painting Washington Crossing the Delaware. Leutze was born in Germany in 1816 but was brought to Philadelphia as a child.

Leutze had a pupil, Eastman Johnson, who became more famous than himself. Johnson was a New Englander, born in Lowell, Maine, in 1824. While still very young he became noted for crayon portraits, first in Lowell and later in Washington and Boston. He earned enough to take him abroad to study at Dussel-

dorf, then a very popular art centre. From there he went to Holland, where he studied Dutch art for four years. It influenced him greatly in choice of subject and in knowledge of colour. He returned to America an accomplished artist, and his pictures of country life and of subjects suggested by the Civil War, became very popular.

For some time our artists flocked for training to the art schools of Munich and Dusseldorf. Then they began to seek Paris. Increasing knowledge of French art exercised a powerful influence upon them. The brilliant school of modern realism as seen in such works as Millet's made merely pretty pictures, conventional in treatment, seem tame and unsatisfactory. Our artists began to aspire to pierce through pretense and illusion and reveal genuine underlying truth. They wanted to show spirit as well as substance.

Disciples of French Art

For fifty years and more all ambitious art students have longed to go to Paris. Among the earliest of those to seek the Paris art schools were three of our most distinguished painters, William Morris Hunt, George Inness and John La Farge.

Hunt was born in Brattleboro, Vt., in 1824. He was a delicate youth, compelled by ill health to leave his course at Harvard unfinished, and go abroad. He went first to Dusseldorf, where he joined the Art Academy, expecting to become a sculptor. Then he went to Paris, decided to become a painter and entered the studio of the famous Couture. Later he fell under the influence of Millet. The first taught him drawing and technique, the second taught him the greater lesson of sincerity and noble perception.

The time had come when American artists, unlike those of an earlier day, were unwilling to expatriate themselves for the sake of a more artistic atmosphere. Mr. Hunt returned to America, and after living for a time at Newport, R. I., moved to Boston, which became his permanent home. In spite of much admirable work he may perhaps be said to have helped American art more as teacher than as artist. His delightful personality won his pupils to his views and the ideals he held before them were of the highest.

The many-sided genius of John La Farge had every opportunity for development. Born in New York in 1835, he grew up in a home where books and art were greatly loved and appreciated, and which was a gathering place for gifted people. He was sent abroad when twenty-one, visited Munich, Dresden, and London, and in a long visit to Paris, met the most brilliant French people of the day.

Although greatly fascinated by modern French art, and in spite of his great talent, he had a strange reluctance to becoming an artist. He returned to New York and entered a lawyer's office. He said himself, "No one struggled more against his destiny than I." When he finally decided to devote himself to art, he went to Newport and studied with Hunt.

Much of his best known work is mural decoration. In this he was well served by one of his greatest gifts — wonderful sense of colour and power of handling it. His predecessors believed that they had only to copy the colours of nature. La Farge analysed and learned the effects of light on colour. He was essentially a scientist, needing to know the how and why of effects. He says, "There is in each competent artist a sort of unconscious, automatic mathematician." Christ and Nicodemus, and The Golden Age, are among his well-known pictures. Young visitors to New York should see his great pictures in St. Bartholomew's church and in the Church of the Ascension.

No one event ever had so great an influence on American art as the Centennial Exposition at Philadelphia. For there many American people had for the first time in their lives an opportunity to see great pictures. It was about the same time too that the first of our young artists to study in Paris studios were returning to begin their life-work in their own country. They brought with them new theories of art, very different from those hitherto accepted. As a direct result the Society

of American Artists was formed. John La Farge was elected its first President and its membership included many of whom America is now proud.

OUR GREAT LANDSCAPE ARTISTS

George Inness was an artist of fearless convictions, and for the most part self-taught. He was born in 1825 at Newburg, N. Y., where as a boy he was apprenticed to an engraver. He was not strong and the close work proved too confining. He went to New York and studied for a time with a French artist. In 1850 he made his first trip abroad. His passion for nature, for beauties of skies and fields and trees, for masses of foliage, strengthened with his skill for portraying them. His early work is sometimes considered too finished in detail, showing the influence of his early training in engraving. He excels in conveying moods of nature, not only the beauty of a given scene but the way it makes us feel. He died in 1894, leaving a great and permanent contribution to American art. He, Alexander H. Wyant and Homer Martin have been called the fathers of modern American landcape.

Alexander Wyant, who painted nature with a rare gift of poetic sentiment, was born in Defiance, Ohio, in 1836. He very early showed talent for drawing. When he was about twenty he visited Cincinnati and there for the first time had an opportunity to see fine pictures. He was especially charmed by one of George Inness's landscapes, sought out Mr. Inness in New York; and acting upon his advice, resolved to become an artist. He went abroad and studied under Gude, a graduate of the Dusseldorf school. Soon after his return, needing money, he entered the employ of the Government on a trip to explore the West. His health gave way under hardships and his companions put him aboard an eastbound train. Although it passed through his home town brave young Wyant determined not to give way to any weakness and continued on to New York to resume his art work. He was never entirely well again, and feeling that his life might be short, he worked all the harder. Much of his work was painted in the Adirondacks, much in the Catskills.

Homer Martin was born in the same year as Wyant, 1836, at Albany, N. Y. His great talent was self-developed, for all the instruction he ever received was a few lessons from William Hart.

Martin had a defect of vision which caused much of the detail of nature to escape him. He saw things in mass and therefore that is the way he painted them, a method which many followed. He visited Holland, England, and France and formed many delightful friendships with fellow artists. Westchester Hills is by many considered his finest picture.

Winslow Homer is one of our greatest painters of ocean. Young and old enjoy his stirring pictures of fisherfolks and their lives, which he painted mostly along the Maine Coast. He is largely self-taught and has always insisted upon painting things as he actually sees them, unmindful of conventional methods. He studied lithographing at first. During the Civil War he joined the army of the Potomac and the spirited drawings sent back to Harper Brothers soon won him fame. His finer work was not accomplished, however, until he became fascinated by the brave, simple people who live along old ocean and brave its perils for their daily bread. The Life Line, Eight Bells, Undertow are among his best known pictures.

We come to one of our most brilliant portrait-painters — John Singer Sargent. Born in Florence, Italy, in 1856, his talent was greatly developed by being brought up in that fair city of the Fine Arts. He had the advantage too of studying in Paris under Carolus Duran. He is a wonderful master of technical difficulties.

Elihu Vedder must be mentioned for his poetic and individual art. La Farge excels him in richness of colour but perhaps no one excels him in skill in drawing or in a strange fantastic imaginative charm. He has employed his talent as a painter in various ways — in illustrating books, in mural paintings and in other pictures. Vedder had the advantage of studying both in Paris and Rome.

George de Forest Brush, a pupil of

the great French artist Gerome, has devoted his best talent in a fresh field, the life of our American Indians. These strange picturesque people appealed to his imagination. In Silence Broken and Mourning Her Braves are full of sympathy with the taciturn people.

Readers of Harper's Magazine have long been familiar with Edwin A. Abbey, for he began his artistic career first as draughtsman, then as illustrator. Unlike most of his contemporaries, his foreign training has been received in England instead of France. He has for years made his home in an old manor house of Oxfordshire. Gradually he turned more and more from drawing to oil painting. Everybody who visits the Boston Public Library for the first time wishes to see his famous decorations, which tell the old story of the Holy Grail. He is one of the few modern artists to whom historical subjects still appeal. Therefore he was chosen to paint the official picture of King Edward's coronation.

James McNeill Whistler is claimed by both England and America. His fame is world-wide. His training was world-wide too. In the early part of his career the Western world was just beginning to discover the charm and beauty of Japanese art. In Paris young Whistler saw Japanese prints and pictures, which had a powerful influence upon him. Much of his early work has a strong Japanese suggestion. But he was no mere imitator. From a wide knowledge of ancient and modern painting all over the civilised world he found and formed his own individual expression. His portraits are very wonderful. The White Girl, His Mother, Carlyle, are examples of those most characteristic of his brilliant original method.

There are some American painters, however, who have not been influenced by European art in any way. One of these was Ralph A. Blakelock, whose pictures are not so popular now as they were twenty years ago. He painted many scenes in which Indians appear. Albert P. Ryder is another. Many of his pictures are attempts to illustrate great literary ideas. The third independent painter was George Fuller, born on a Massachusetts farm in 1822. There he spent much of his life painting for his own amusement.

Our American painters have for years been taking the best of all the foreign influences and bringing them to bear in the home field. The days of crude imitation have long been over. So are the days of undisciplined imagination and trivial sentimentality.

While perhaps we have now no artist who ranks with the greatest of the world, we have many whose work is worth mentioning. William M. Chase paints portraits and is also well known as a painter of lifeless objects, — still life the artists call it. The portraits of John W. Alexander are prized, and his mural decorations have attracted much attention. Horatio Walker so loves rural scenes that he now lives on an island in the St. Lawrence River, where he paints the farmers and their cattle. Frederick Dielman and Walter Shirlaw also deserve mention.

Nor must we forget Thomas W. Dewing, whose exquisite studies of women are seen every year in New York, Childe Hassam, who paints chiefly in the sunlight, John W. Twachtman, now dead, whose outdoor scenes have a haunting beauty no one can forget. Then there are E. H. Blashfield, C. Y. Turner, Gari Melchers, Frederick Ballard Williams and dozens of others.

Then there are the women painters, many of them. Mary Cassatt, the painter of motherhood, now spends most of her time in France, but she is American still. Cecilia Beaux paints brilliant portraits, and there are many others. If we should count the men and women who draw for the magazines our list would stretch out too long. Some of the best art work in America is now being done for some of these publications.

Today we have artists of whom we are rightly proud, these artists whom we have named and many others. They are masters of technique and they are more than that. For according to individual insight, loyal each to his own peculiar vision and temperament, they seek to reveal the truth of nature, not alone the outward aspect but the hidden soul of things.

EIGHTEENTH CENTURY PORTRAITS

Mary Storer, by J. S. Copley.

General Nathanael Greene, by John Trumbull

Don Josef de Jaudenes y Nebot and his American wife, Matilda Stoughton, by Gilbert Stuart.

All the pictures for this article, except the portrait of General Greene, are from the collection of the Metropolitan Museum of Art, New York City.

WASHINGTON AS A YOUNG MAN

The likeness of Washington we usually see is made from the Stuart portraits. This, by Charles Willson Peale, represents him as a much younger man, before his mouth had been changed by the loss of his teeth.

Here we see an example of the work of F. E. Church, entitled The Heart of the Andes. This artist painted subjects from the far North to South America, seeking always the impressive and magnificent.

This picture, entitled Peace and Plenty, is a good example of the work of George Inness, though his later works were not done with so great detail as this shows. In colouring it is very beautiful.

Though usually called a View on the Seine, this picture by Homer Martin was really painted in Normandy. This is an excellent example of his work and is of surpassing beauty.

Some consider this one of the best examples of A. H. Wyant's work. It is entitled Forenoon in the Adirondacks, and is now owned by the Metropolitan Museum of Art, New York City.

Photograph copyright, 1910, by Metropolitan Museum of Art.

AN INTERESTING PORTRAIT

John W. Alexander's work is always interesting, and his portrait of Walt Whitman, the "Good Gray Poet," is fascinating. There is something about the lion-like head which compels your attention. Some think this is Alexander's best work.

SPECIMENS OF THE WORK OF HUNT, WHISTLER, AND CHASE

The Figure of a Girl, by William Morris Hunt.

Sir Henry Irving in the character of Philip II of Spain, by James McN. Whistler.

Carmencita, by William M. Chase.

Part of a frieze on the Temple of Apollo, near Phigalæia, in Arcadia, that was built in the year 470 B.C.

A LITTLE TALK ON SCULPTURE

CONTINUED FROM 4090

WHEN we hear people talk about art and artists, we in America at once think of pictures and painters, because in America there are many more pictures than sculptures. But art also includes music, architecture, decoration of houses, and what is perhaps the highest and noblest of all—sculpture. Few statues are seen in England, because the climate is cold and rainy and foggy, and statues in marble would not look well under these conditions. In Italy and France, where the sun is warmer, and fog and rain are comparatively rare, they have much sculpture, both in marble and in bronze.

To understand exactly what sculpture is, and what is good and what is bad, we must know what is meant by a statue, a relief, a bust, and a panel. And this is easily told.

A statue, as we all know, is a sculptured or carved figure of a human being or an animal. Statues may be life-size, larger than life, or smaller. When they are very small they are called statuettes. When they are much larger than life they are called heroic.

A bust is just the head and shoulders. A relief is a sculptured or carved figure, or several figures, or flowers, or anything else, on a background or slab. If we should see the Nelson column in Trafalgar Square, we shall notice that there are sculptured pictures at the sides of the base. These are reliefs—*high* reliefs, because they stand out boldly. If we see a relief that does not throw much shadow, we shall know it is a *low* relief. Panels are reliefs set in frames. The art of sculpture is very, very old. Even in the far-off days of Pharaoh even before the days of which we read in the Bible, there was sculpture.

The oldest important piece of sculpture that we know is the great Sphinx, a huge lion with a woman's head, half buried in the desert sand near the Pyramids in Egypt. The Egyptian sculpture was very simple and primitive, but at the same time refined and beautiful. In sculpture the Egyptians and Assyrians were the forerunners of the Greeks. That is to say, the Greeks followed the Egyptians in respect of time—in fact, the Greeks were at their best long after the Egyptians had done their best work.

Before the history of Egypt began, before the first dynasty, or family of kings, the prehistoric inhabitants carved figures, statues and heads, and many reliefs which, though crude, are good enough to show us that they must have been practising sculpture for a very long time before. Some of these very early works are in our great museums. The first dynasty began about 4800 B.C., and up to the end of the thirteenth

dynasty, in 342 B.C., the sculpture of Egypt advanced to a very high standard. In 331 B.C. Alexander the Great conquered the Egyptians, and from that time their sculpture grew more and more like that of the Greeks.

THE TWO SOLITARY STATUES THAT KEEP GUARD OVER THE PLAIN OF EGYPT

Two pieces of the time of Amenhotep III. are so well known that we must remember them and the king who commanded them to be set up. These are the two gigantic statues on the plain near Thebes. They are sitting with their hands upon their knees, and seem to be keeping watchful guard over the plain and the distant temples and royal tombs.

After the death of Alexander the Great, in 323 B.C., Ptolemy I. ruled; and to the end of the Ptolemaic dynasty, when the Romans came to Egypt, the art of sculpture was influenced by the Greeks. But under the Romans it gradually sank and died out, just as the people themselves ceased to play a part in history. So we can leave them and pass to other countries.

We must remember that in Assyria they had sculpture just as in Egypt, but, like that of Egypt, it had but little influence upon other nations, and gradually died out. But now we come to the Greeks—the great nation that produced the best sculpture the world has ever seen. From 1000 B.C. to about 550 B.C. it was archaic—they made statues as a child of to-day would make them—stiff and lifeless. From about 550 B.C. to 430 B.C. they developed their art and tried to make statues more like real beings. This advance was first made in Ionian Asia Minor. The Ionian merchants were very much in touch with Egypt and Babylonia, and so the art of the Ionians was somewhat influenced by these countries.

THE GREAT GREEK MASTERS AND THEIR WONDERFUL WORKS IN STONE

But Greek sculpture was also slowly advancing in Argos and Attica, where the sculptors met and saw each other's work, and so their statues became more like each other, the one sculptor adopting in his statues points that he found best in the other's work. The Greeks were very fond of athletic games, which were of such importance to them that they often made statues of the Olympic champions. One of these statues, the Discobolus, by Myron, is in the Ashmolean Museum, Oxford. It is a beautiful statue of a disc-thrower — disc-throwing being a sport of which the Greeks were very fond. Two of the very finest examples of Greek sculpture can be seen in the British Museum. One is of draped figures, the other a nude figure. The former are the Three Fates, from the Parthenon at Athens; the latter is the Theseus, from the same temple. The whole decoration of the Parthenon is the work of Phidias, the greatest of all Greek sculptors. Other great sculptors were Polycletus, Praxiteles, Scopas, and Lysippus.

Among the most famous works that have been preserved to our day are the wonderful Venus of Milo, at the Louvre in Paris, named after the island of Milo or Melos, where it was found; the Victory of Samothrace, the Doryphoros by Polycletus, and the Hermes by Praxiteles.

THE DARK AGES IN WHICH THE ART OF SCULPTURE DISAPPEARED

Greek sculpture developed and flourished up to 150 B.C., about which time the Romans, under Mummius, conquered Greece. The Romans not only carried off the finest works produced by the conquered people, but induced the best Greek artists and craftsmen to come to Italy, so that Greece ceased to produce great works, while the sculptors of the Roman Empire devoted themselves mainly to the making of portrait busts and the copying of famous Greek originals, until the art declined altogether at the time of the fall of the empire.

In the so-called "Dark Ages," sculpture was of very little account. It was believed that the end of the world would come in 1000 A.D., and we can easily understand that as this year approached everyone grew more and more alarmed, and cared very little as to decorating the cities and houses. Thus sculpture died out almost entirely. Nobody wanted it, nobody practised the art. At last the year 1000 ended, and nothing had happened. People began to realise that they had been mistaken. Then, as they were able to feel more sure of this, they became very thankful to God, and grew more religious. They built many churches and cathedrals, and consequently a new demand arose for sculpture.

France was the first country to revive this art. Cathedrals were built, for instance, at Rouen, Amiens, Chartres, Bayeux, Rheims, and Bourges, and, in all these, many statues were placed. In England, also, the religious movement grew, and during the next 500 years most of the cathedrals were built.

THE FINE RELIGIOUS SCULPTURES CARVED BY THE OLD STONEMASONS

The sculptures in these buildings were not done by what we should call great sculptors, for there were none in those days. The stone-carvers were just simple tradesmen, or craftsmen, like the stonemasons. They learned their trade, or craft, from their fathers, who had learned it from their fathers before them. It was not until the time of Queen Elizabeth that sculpture really found a footing in England, and that sculptured figures and statues began to be used to any great extent.

But the great movement of the Renaissance, which means *re-birth*—the re-birth of classic art and classic learning—began in Italy. The cathedral sculptors belonged to the so-called *Gothic* period, and, with all their love of beautiful detail and their deep feeling, they were often awkward and stiff, lacking in dignity and personal style.

The first great Italian sculptor was Niccola Pisano, who was born about 1206 and died in 1278. While still influenced by the Gothic carvers, he had studied the scarce examples of classic art that had come to his notice.

He had many followers, the most famous of whom were his son Giovanni, and Andrea Pisano, who lived from about 1270 to 1349, working much of the time in Florence. Now the sculptors increased in numbers, and they wished to imitate the Greeks and Romans no more, but rather, like the Greeks, to copy Nature as they found her. They made men in stone as they appeared to be in life, and they carved flowers and trees and animals just as naturally as they could.

THE MODERN MASTERS AND THEIR SPLENDID HORSEBACK SCULPTURES

In 1378, Lorenzo Ghiberti was born in Florence, and he has left in that city many beautiful works, such as the famous bronze gates of the Baptistery, that we see on page 2783. Donatello, his pupil, was born about 1386. He made even a greater name than his master, and three of his best works are the St. George and the David in Florence, and the Gattamelata in Padua, the first large equestrian, or horseback, monument of modern times. From year to year the arts of painting, architecture, and sculpture advanced. After Donatello came Jacopo della Quereia and Luca della Robbia. Luca modelled the little white babies on blue backgrounds, reproductions of which we see in the large stores. Then came Verrocchio, born in 1435, who, together with Leopardi, made the wonderful Colleoni monument in Venice, the finest equestrian statue in the world.

At last we come to the greatest of the Renaissance sculptors, Michael Angelo, born in 1475. He was a good painter, and a great architect, but his sculpture astonished all who saw it, and it remains some of the best work the world has ever seen. We can only mention his chief works here. These are: David, a colossal statue, and the Medici tombs in Florence; and Moses, and the Pietà in Rome. Benvenuto Cellini, goldsmith and sculptor, and Giovanni Bologna followed; and Bernini carried on the spirit of the Renaissance to about 1680, although the work of Bernini shows much of the exaggerated restlessness and floridness of what is now commonly known as the *baroque*, or uncouth and irregular, period.

HOW THE SCULPTORS SPOILT THEIR WORK IN TRYING TO MAKE IT BETTER

Sculpture now was on the decline. Instead of keeping their works strong and simple, the artists made them more and more elaborate and delicate. Sculpture had reached its best, and Bernini, in trying to make it better by copying every little detail, spoilt it and weakened it, because it was not sufficiently simple. His bad qualities were copied and imitated and increased by the sculptors who came after; and thus the art grew worse and worse. The decline was not like that of Egypt, where sculpture was stopped and stamped out by the Roman conquest, but it simply became more tasteless, too ornate, and too extravagant.

Meanwhile, sculpture in France had progressed under Francis I., who became king in 1515. He encouraged art with great energy, and in building his palaces he employed such sculptors as

Goujon, Cousin, Pilon, and many others. Chief of them was Jean Goujon, whose Diana, now at the Louvre in Paris, is sufficient to make him famous. Pierre Puget followed, and Girardon, Falconet, and Pigalle. But we need not stay here to mention their work, for they belong to an indifferent period. It is better to begin again with the modern men, who started yet another revival of sculpture, which is still advancing.

How the Modern Sculptors Tried to Revive the Classic Style and Failed

Of these men, Clodion and Houdon were eminent. Though they followed and were influenced by those whom we have just mentioned, their work was simpler and more refined. After them came a period in which sculptors tried to revive, or imitate, the style of the Greeks. This attempt was made not only in France, Italy, and Belgium, but also in England, where little had been done, so far, in sculpture.

The imitation classic revival lasted roughly from 1789 to 1848. The men responsible for it were chiefly Canova in Italy, Thorwaldsen in Denmark, and Flaxman in England. Their works were cold, and did not seem to live; nor were they pleasing, because they did not look like men who lived and worked—they were simply commonplace imitations of the Greek statues, which they did not really understand. They did not know why Greek statuary was so good; and, in copying, left out all that was fine and beautiful, and thus made statues that were extremely dull and lifeless, very lumpy and heavy, and quite uninteresting.

The Sculptor's Return to Nature and the Statues of Real People

But now Englishmen began to think more of art. They were at first very pleased and impressed with the imitation of Greek, because they thought they were making sculpture just like the ancient Greeks did. Flaxman, who modelled the beautiful reliefs on Wedgwood vases and plaques, introduced the classic, or Greek, idea into England.

But soon the sculptors got tired of it. They wished to represent and carve, not Greek gods, but men and women of their own time. Thus they began to be more real, and to copy Nature instead of the work of men who lived in the ages before Christ. Chantrey and Gibson in England, and Dubois and Dalou in France, made this change felt; and it was farther advanced by Alfred Stevens, Lord Leighton, Onslow Ford, Hamo Thornycroft, and others. Stevens's Wellington Memorial in St. Paul's Cathedral is the finest monument ever produced by a British artist. We can see Leighton's Athlete and Python in the Tate Gallery, together with Onslow Ford's Egyptian Singer. In the United States during the past twenty years many men have done good work. Augustus St. Gaudens excelled in portrait sculpture, while Frederic Macmonnies' Bacchante has won much praise. George G. Barnard has produced some striking figures for the new capitol of Pennsylvania. Several other men are hardly less important, and their number is increasing.

Auguste Rodin, the Greatest of Modern Sculptors

The greatest of modern sculptors is, some think, the Frenchman Auguste Rodin. He is unlike any other sculptor, except, perhaps, the Belgian Constantin Meunier. While Meunier was making sculptures of working men and women, and making them look like peasants and labourers, Rodin was breaking away from the academic school—the set of sculptors who thought sculpture must be smooth and classic in pose—and was picturing, in marble and bronze, people *as he saw them*. Rodin has made his figures in natural attitudes, which was not done before, because people were used to the stiff and academic positions, such as we see in the work of the imitation classic period.

The Dock Labourer, by Meunier, is in the Luxembourg Museum in Paris, besides his Puddlers at the Furnace and The Glebe. The Kiss, by Rodin, is in the same museum; while at the Pantheon, in Paris, we can see The Thinker, one of his best works. There are also two of his remarkable sculptures at the Victoria and Albert Museum at Kensington.

Our younger sculptors in America are doing beautiful work; and sculpture in America is now, it is safe to say, as good as any modern sculpture of other countries. These men are thinking more for themselves, and are copying old work less than was formerly done.

The next Familiar Things are on page 4425.

THE MIGHTY SCULPTURES OF OLD EGYPT

Here are the two gigantic statues set up on the plain of Thebes in Egypt about 1400 B.C. They are the largest seated figures in the world, and are made of sandstone blocks quarried near the Nile. One of them has been known as the Singing Memnon, because of the sound given out by the stone when warmed by the morning sun.

The great Sphinx is the oldest colossal sculpture in the world. With a lion's body and a woman's head it lies on the edge of the desert, carved out of a huge rock protruding from the sand. It is about five thousand years old. The mystery of this strange statue has always exercised great fascination upon imaginative minds.

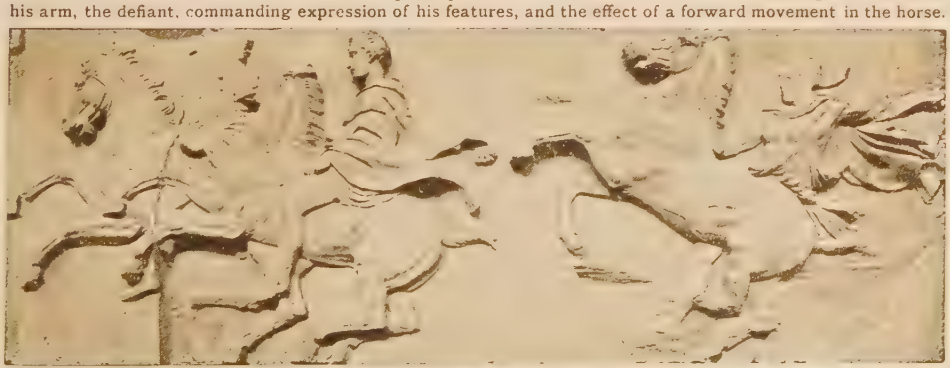
THE FIRST MODERN HORSEBACK STATUE

The monument of the general Gattamelata on horseback, by Donatello, is the first equestrian monument of modern times. In his days, nobody but Donatello could have undertaken the difficult task of casting a horse on heroic scale in bronze, and even he found it necessary to place the raised forefoot on a ball for support.

Here is a portion of the frieze which decorated the Parthenon at Athens. This is the work of Phidias, and surpasses in beauty any work the world has seen. The spacing of the figures and the sense of movement are marvellous. The whole design represents a long procession of mounted horsemen going to sacrifice to a god.

THE WORLD'S FINEST STATUE OF A HORSE

The monument in Venice to the Venetian general, Colleoni, by Verrocchio, is the noblest and most imposing equestrian monument in the world. See how proudly the bold soldier sits his horse; note the vigorous action of his arm, the defiant, commanding expression of his features, and the effect of a forward movement in the horse.



This portion of the Parthenon frieze shows even more vividly than that on page 4164 the sense of movement created by the lines of the horses' legs and the flying drapery. A notable thing is the completion of action in the frieze. One horse raises his leg, the next horse raises his higher, and so on till the action is completed.

A WONDERFUL GROUP THAT SEEMS TO MOVE

This statue, called the Laocoon, is the most beautiful group of later Greek sculpture, when artists were no longer satisfied with simple figures in repose or moderate action, and tried to express violent movement and passion. It is the work of Agesander, Polydorus, and Athenodorus, and was discovered in the year 1506.

TWO OF THE WORLD'S FINEST STATUES

Donatello's St. George in Florence is perhaps the finest example of armour in sculpture. The naturally hard and metallic appearance of the armour is softened and beautified by the clinging of the garments to the body.

The Venus of Milo, so called from the island where it was found, is the most perfect female statue in the world. The surfaces are broad and simple. The grace of outline and the modelling have never been equalled.

OLIVER CROMWELL AT WESTMINSTER

Oliver Cromwell, by Hamo Thornycroft, is a good example of modern English sculpture. Note how the artist has expressed, in the firm attitude of the short-set figure and in the resolute face, the character of the man of action. The whole of his life was determined by the Bible and the sword; and both are happily introduced.

GREAT SCULPTURES OF MODERN MASTERS

Constantin Meunier was the first sculptor to represent the working man. This example is one of his strong and exceedingly simple works. The light falls softly over the modelling; only the big forms are modelled.

This is the figure of Lorenzo de Medici on his tomb in Florence. Michael Angelo thought of splendid gestures, unlike the gestures of other statuary of his time. He made the most of muscular form when it was beautiful.

The Citizens of Calais, by Auguste Rodin, represents the men who, at the command of Edward III. of England, went out of the city to his camp with ropes round their necks. There is true pathos in their hopeless sorrow; anguish is portrayed in all their features, and everything is done to direct attention towards their grief

THE HERO OF KHARTOUM IN BRONZE

General Gordon, the hero of Khartoum, is here represented in bronze by Onslow Ford. The very careful work bestowed on the elaborate trappings of the camel and the details of the uniform detract from the grandeur and impressiveness of the conception, and as a result of this minute detail the monument suffers in massive effect.

The photograph of General Gordon on this page is by Messrs. Russell; the others are by Messrs. Anderson, Beato, Neurdein, and Mansell.

THE NEXT FAMILIAR THINGS ARE ON PAGE 4405

THE TOILERS OF THE SEA

WE have read many famous books in English literature, and will turn now to some of the great novels of French authors. Victor Hugo is a romancer of world-wide fame; his is one of the most illustrious names in the literary annals of France. "The Toilers of the Sea" is not his greatest work, but it is the most suitable for our book, and it is a very fine story of heroism and self-sacrifice. It was written while the author was an exile in the Channel Islands, the natives of which are of French descent, though they are British subjects.

CONTINUED FROM 4168

AT the town of St. Sampson, in the isle of Guernsey, lived an old seaman, Lethierry by name. The pride of his life, his chief and only care, was his beautiful niece, Deruchette, whose future he meant to make happy and comfortable, so far as honest toil could ensure.

A man of unusual strength, he was accustomed all his life to great bodily exertion, and now, when he was engaged in the strenuous work of shipbuilding, he found himself at fifty years no longer able to lift his three-hundred-pound anvil with one hand! This made him think that he was not so young and vigorous as he used to be, and that he must lose no time in gathering together that little fortune for his niece.

Now, Mess Lethierry was not only a man of courage, as he had proved many a time in the teeth of vicious seas, but his good sense told him that when he was satisfied with a new idea it would pay him to be bold and risk every penny he possessed on it.

Thus he set himself confidently to the building of quite a new kind of ship, which, unlike all the others he had built before, was not to depend on sails, but on strange machinery worked by boiling water for its means of motion. There, day after day, in his shipyard at St. Sampson, he plied his skill and spent all his money on the making of this new ship, and when at last the wonderful engine arrived, and was fitted in its place, Lethierry had grown almost as fond of the Durande—for so he christened his boat—as he was of his adorable niece, Deruchette.

At length the great day came when, with much noise and the belching forth of smoke like a small volcano suddenly grown active, the Durande, its whirling paddles suggestive of monstrous fins to the simple fisherfolk, who had never before looked upon a steamship, began its new life as a coasting steamer. As it could carry far more cargo than the old-fashioned coasters, and do its journeys from port to port in much less time, the Durande was a success from the first.

The happiest days of Mess Lethierry's life had now come, for he felt himself the luckiest of mortals, as he stood there on his wonderful steamboat and directed it among the ports of the Channel Islands or across the often dangerous waters to the old pirate town of St. Malo, on the rocky coast of France. Happy and prosperous years passed thus, until the captain's joints were so stiffened with

rheumatism that he had to give up the command of his boat to a clever sailor named Clubin, who was supposed to be as honest as he was skilled in the ways of the sea.

This Clubin, however, was noted for his honesty simply because he had not yet had an opportunity of proving what a rascal he was at heart. He had been patiently waiting for the chance to come when he might enrich himself at his master's expense, and make off to some place where, with his ill-got gains, he might enjoy himself better than toiling in the stormy waters of the English Channel. To help him at the right moment, he possessed himself of a very cunning invention, which a man from America had sold to him, in the shape of a revolver. He knew that the time had come when this would enable him to play his master-stroke.

Clubin had brought the Durande into St. Malo, and it was there he meant to make his bold stroke for fortune. Armed with his revolver, he betook himself some distance from the town to a little wood close by the edge of a great cliff that threw its shadow far below on the waters of the Channel.

A VILLAIN'S MASTER-STROKE IN A GREAT GAME FOR FORTUNE

There, on the edge of the cliff, he saw a coastguard watching a vessel that lay some little way off-shore. A small boat was being rowed from the vessel towards the cliff. While the coastguard stood watching, a tall and muscular sailor crept from the shelter of the rock as silently as a cat, and, striking him a deadly blow between the shoulders, sent the unsuspecting watcher headlong into the sea. As the murderer stood calmly looking at the rippling circles where his victim's body had disappeared, Clubin stepped softly from his concealment, the useful revolver in his hand.

"You have just killed a man, Rantaine," he said quietly.

At this the murderer turned quickly, only to find himself facing Clubin's wicked little weapon.

"Stand where you are," said the captain, "for I have six shots here, and they may either kill you or alarm the nearest coastguard."

Dismayed and cowed by the warning click of Clubin's revolver, Rantaine asked what he would have of him.

"Yesterday I watched you," said Clubin, in a voice of irritating softness, "while you went to a money-changer and got from him three English banknotes for one thousand pounds each, in exchange for seventy-six thousand francs. This money you had stolen from Mess Lethierry. Then you arranged with the master of that ship out there to make good your escape. The notes are in your tobacco-box. Don't deny it; but just put your hand in your pocket and throw the box over to me."

DIAMOND CUT DIAMOND, OR TWO RASCALS AND THREE THOUSAND POUNDS

Never for a second did Clubin cease to cover the other villain with his revolver, and Rantaine, with many a vain curse, protesting that he was as helpless as a child before that thing, at length did as he was commanded. When Clubin had assured himself that the banknotes were safe, he said:

"You may go; your boat is near."

And down the perilous cliff the outwitted rascal scrambled. Once in the boat, he called back that he would write to Lethierry to say that he had paid over three thousand pounds for him to Clubin. The latter heeded not, but quietly returned to St. Malo. The first move in his great game had been won!

That night the master of the Durande began preparations for sailing next morning, though all the mariners expected it would be a day of fog, and he knew this as well as any. In the morning, however, as the Durande steamed away from port, the sky was so bright and the sea so calm that the prophecies of fog seemed foolish.

THE CAPTAIN OF THE DURANDE PREPARED FOR THE SECOND MOVE IN HIS GAME

For hours the vessel made its way, and the passengers on board had hopes of a calm and uneventful voyage, when suddenly a bank of fog was seen on the horizon. This increased until the steamer on its onward way had become engulfed in it. But there was no slackening of speed. The Durande still forged ahead. A feeling of uneasiness seized all on board when the engineer was heard to say to his assistant: "This morning in the sun we were going at half speed, and now we are ordered full speed ahead in the heart of the fog."

It seemed but a few moments after this that the vessel struck on a great

rock. It was as though the Durande had leapt from the waters and impaled herself on some strange mountain peak thrust up through the sea. But while all was excitement and disorder, the captain of the vessel was cool and collected. He had the long-boat quickly launched; passengers and crew hurried into it.

THE WRECK OF THE DURANDE IN THE FOG IN THE CHANNEL

"Push off!" he called out, when urged by them to jump in. "I shall stay here, for when the ship is lost the captain is lost also!"

Little though the passengers and crew guessed it, as they pulled away in the ship's boat, this was the second move in Clubin's game for fortune. And, little though he knew himself at that moment, it had not succeeded. His scheme had been to steer the Durande on to a group of rocks only a mile from shore, and by swimming that distance, an easy feat to him, he would have gained a deserted part of the coast. At some lonely farmhouse he would get dry clothing, and later make his way to a distant port, so escaping with the three thousand pounds.

It was, therefore, with a terrible change from satisfaction to dismay that Clubin discovered, during a momentary lessening of the fog, that his vessel had struck the terrible Douvres rocks, full five-and-twenty miles from shore! Yet he did not utterly despair, as smugglers often passed near these weird rocks, and might take him off without questions if he paid them well.

As the fog gradually lifted, and Clubin wished to take his bearings, he decided to gain the summit of the higher rock. To do so he needed to plunge into the sea and swim to the reef.

THE DOUVRES ROCKS AND THE DOOM OF THE WICKED CAPTAIN

Stripping himself of most of his clothing, and fastening a belt around his waist, with the precious tobacco-box, he dived from the wreck. The water was deep, and he dived well. But he did not come up again, for as he went down he had been seized by some strange thing, in whose grip was death.

The shipwrecked crew and passengers safely reached St. Sampson that night, and great was the consternation when it was known that the Durande had struck the Douvres. Lethierry could scarcely realise his loss. He was stunned, like one who has suffered a great bereavement. The captain of a cutter which came in later reported having seen the wreck and watched it in the now boisterous sea being hurled farther on the rocks, and held fast between the two giant pillars of the Douvres. There was no sign of Clubin anywhere. He thought that while the vessel's hull was beyond repair, the engine might be intact.

For a moment old Lethierry's spirits revived at the thought of the engine being saved. Only for a moment. He knew too well the terrible nature of these rocks, their scant foothold, and the almost incredible labour that would be necessary to cut the engine out through the wooden decks and plankings.

"No, it is all over," said the captain of the cutter, as if he were answering the thoughts in Lethierry's mind. "There does not exist a man who could go to these terrible rocks and save the machinery of the Durande."

THE FISHERMAN WHO WENT TO FIGHT THE SEA FOR THE DURANDE'S ENGINE

"If he existed," exclaimed Deruchette, who had been trying to console her uncle, "I would marry him!"

"You would marry him, mademoiselle?" said a tall young man, almost in a whisper, when he had made his way from the outside of the crowd, and stood before her. He was a fisherman named Gilliatt, so quiet and determined that many thought him strange.

The eyes of all were directed on him as old Mess Lethierry said, with great solemnity, that Deruchette should be the wife of him who could save the engine.

The next night the fishermen and lighthouse-keepers were speaking of some madman whom they had seen piloting a strongly-built sloop out through the most perilous passages of these rock-studded seas into the darkness. It was Gilliatt of whom they spoke; for he had determined to win the prize which had seemed beyond his wildest dreams. He was bound for the Douvres rocks, and he was taking the shortest way with all its dangers, as not a moment was to be lost in this battle with the sea.

Out into the dark he sailed, threading his way as none other would have dared. Out from the darkness to the dawn, and so into the broad light of day,

which was shining on the grim and desolate Douvres when Gilliatt had brought up his sloop there. The two giant pillars of rock held up the broken vessel almost like a nut in a nut-cracker. But Gilliatt had no time to marvel at the sight. Making fast his vessel, he sprang ashore and climbed to the wreck.

How Gilliatt began his battle with the sea at the Douvres

His examination proved that the after-part, with the precious machinery and paddle-wheels still intact, had been driven firmly between the two upstanding rocks, while the fore-part of the vessel had broken off and sunk into the sea. Quickly the brave fisherman mapped out the situation, and determined on his plans.

There, once a dangerous passage had been overcome, was a piece of sheltered water where his sloop might rest secure. When the tide was low he could go between his own boat and the wreck by jumping from rock to rock, but at high tide the sea would cut off this connection, and, as it was impossible to make a shelter for himself on the wreck, all that he could do was to choose the top of the higher of the two rock pillars as a refuge during high water. To this he could climb from the wreck by throwing up a knotted rope to which he had fixed a grapnel.

In a cavern of the rock he slept the first night, and found when he awoke next day that his food-supply had been blown into the sea. Nothing daunted, he gathered some limpets, and, breakfasting off these, began his work in earnest.

The toiler of the sea and how he matched his wits against nature

In one of the caves Gilliatt rigged up a rude forge with stones and material from the wreck. For he was no mere fisherman; he had all the resource and ingenuity of one born to outwit Nature with the invention of the engineer. His life as a fisherman and sailor had taught him how to do things in the simplest and most effective ways, and his natural ingenuity enabled him to invent methods of working on the wreck that made up for his lack of proper tools. But above all was the burning desire, the firm determination, to accomplish the great task he had undertaken, and so to be able to claim the loveliest of all the girls in Guernsey for his bride.

With the vigour of a giant and the industry of one who laboured to save his very life, Gilliatt went about his task from day to day, supporting himself only by such food as the shell-fish about the rocks afforded. Bit by bit he took down the paddle-wheels and stowed them carefully away in his sloop. With rude saws and chisels, made from things in the wreck, he gradually cut away the decks and planking of the Durande, until her precious engine was exposed.

Seated on the rock with folded arms and anxious face, he now pondered over the greatest task of all. How to transfer the machinery from the wreck to his own sloop? He knew that if he could but lift it as one mass there would be room for it aboard his boat. With powerful tools it would have been an easy task, but without a single appliance of any power it meant a feat of engineering.

The labours of a Titan and how a fisherman performed them

Four great beams of wood which he had saved from the wreck now came in handy. Hoisting these up by means of the capstan, he managed to wedge them between the two pillars of rock above the remains of the vessel. They were thus like the beams across a workshop roof, and from each one of them he hung a hoisting tackle. His next movement was to cut four holes in the deck on the starboard side of the engine, four on the port side, and a hole corresponding to each of these through the keel. Cables were then passed through the deck-holes, through those in the keel, and carried across the bottom; then upward through the holes on the opposite side, and back to the hoisting tackles. All four tackles, with their cables, were now brought together at one point of the beams, and held by a single tackle, so that one hand could control the lot.

The heroic labours of the fisherman were still far from being finished, though the progress he had made was worthy of a Titan. For more than two months had he laboured at his wild and strange task all alone. No one would have known him, so terribly had he changed as a result of his toiling in the sea. His beard had grown, his hair was long, all over him were cuts and bruises. His food had been nothing but shell-fish, his only fresh water the rain and dews

that gathered in the crevices. Hunger was ever gnawing within him, thirst seemed to have him always by the throat, and he suffered all the time from cold.

HOW THE ENGINE WAS TAKEN OUT AND LOADED ON THE FISHERMAN'S BOAT

Only the fact that Gilliatt had an intelligence far superior to that of the ordinary fisherman could have kept him at his terrible task. The sufferings to be endured from day to day would have daunted even a brave man, and in his unequal battle with the sea, only the inventor's delight of seeing his plan succeed held him to his task—that and the quickening hope that one day soon he would return to St. Sampson, a man of note for his achievement, and have the most charming girl in all Guernsey for his wife. Thus was he buoyed up in his work, and so he toiled along, enduring his hardships for the sake of the prize he now saw coming nearer day by day.

It was only after enormous toil and by fixing a series of great spikes into the rock, to which he attached some immense pieces of the wreckage that made a sort of swinging gate across the narrow defile between the two pillars of rock, that Gilliatt ventured to bring round his sloop from its safe anchorage to this perilous position below the wreck of the Durande. His plan was now to guide the great mass of machinery and planking, which was held suspended by the cables from the beams, on to the deck of his stout and capacious sloop.

How this was done it is difficult to tell, and for a moment it looked as if all his ingenuity would only result in the foundering of his sloop; but, to his great joy, the straining pulleys ceased to creak, the cables slackened, and the engine was safely deposited in the sloop.

GILLIATT'S LAST GREAT BATTLE WITH THE WAVES AND WINDS

Gilliatt had but a brief time wherein to contemplate with satisfaction the success which had now crowned the labours of his brain and hands. There was a sudden stirring of the waters, a rising of the wind, heralding the coming of a tempest, long delayed. Once more had Gilliatt to prove himself a giant toiler. His first care was to swing his gate across the defile and lash it securely with chains and cables. Then, swimming and wading to the outer rocks, he threw up, by means of beams and chains, a rude breakwater, so that when the tempest broke in its fullest fury on the Douvres rocks, his sloop with the precious engine aboard would have at least the protection of the gate across the defile and this rough breakwater.

When the tempest let loose all its mighty forces of wind and rain and lightning on the Douvres, it found a weird and haggard figure of a man ready to do battle with it. And for twenty long and raging hours did Gilliatt match his wit against the brute fury of the elements. Now, by breaking down some part of the wreck, he made a barrier at the other end of the defile; again, by dislodging a massive piece of rock with a beam, and letting it roll into the seething waters, he just saved his breakwater from ruin.

At last the tempest ceased, almost as suddenly as it had begun. The blue sky was above him again; Gilliatt had won in his battle with the waves and winds. So, lying down on the deck of his sloop, he slept from sheer exhaustion, and when he awoke it was to realise his great hunger rather than to rejoice in the successful issue of his toils.

A STRANGE ADVENTURE IN A WEIRD CAVERN OF THE SEA

Stripping himself to the waist, he left his boat and climbed on the lower part of the reef, where he saw a large crab go under a great shelf of rock. Putting his knife between his teeth, he crawled after it, and, to his amazement, found himself in an underground cavern where he could stand up.

It was a weird and mysterious place, the existence of which in all his days upon the rock he had never before suspected. There, in the centre of it, was a strange, uncanny pool of green cold water, whence great pillars of rock arose and disappeared in the gloom above. All around him were the waving leaves and tendrils of strange sea growths. It was a place to strike dumb terror to the heart of the bravest. But Gilliatt was undaunted, and his hunger goaded him to find the crab that had led him there.

Wading into the water of the sullen green pool, he was groping about in the rock crevice where the crab had disappeared, when suddenly he felt his arm seized by some living thing!

Around his naked arm he felt this thing twisting, rough and flat and cold and slimy. It was creeping up towards his chest, tightening like a cord. He tried to pull away a little, but found that he could scarcely move, as the thing that held him was as supple as leather, strong as steel, and icy cold.

THE FISHERMAN'S FIGHT WITH THE GIANT CUTTLEFISH

Then from the hole in the rock whence this mysterious thing had come there came another that wound itself about him, creeping over his skin with innumerable flat, round points that stuck to him like suckers, and caused a strange sense of pain.

From the crevice of the rock there came another, and yet another of these awful living thongs, that bound him helpless, and a fifth had fastened on him before he could dimly see the horrid shape of the monster, with its two great eyes set in the middle of its short and pulpy body. He was in the grasp of a great cuttlefish, or devil-fish, as it is sometimes called.

Its tentacles held his right arm powerless, and it was advancing towards him, with its parrot-like jaws ready to fasten on his side. Then, indeed, there had been an end of Gilliatt and his plans; but, with a rapid sweep of his free hand, in which he had his knife, he quickly severed the hideous head of the uncouth creature, and immediately he felt its tentacles relax.

He had freed himself, and was about to flee from this cave of terror, when he noticed, partly buried in a heap of crab-shells, a skeleton with a belt around its waist. He pulled at this, and as it fell apart he found himself with a small iron tobacco-box which enclosed some pieces of paper.

THE TOBACCO-BOX THAT GILLIATT FOUND IN THE CAVE ON THE DOUVRES

They were the three thousand-pound notes. This had been the end of Clubin! Gilliatt's knife had enabled him to escape the same terrible death.

It was two days later that Gilliatt arrived in the dusk at St. Sampson, and moored his boat close by the house of Mess Lethierry. All that he had hoped to do was done. He had achieved what others had believed to be the impossible. He had suffered, he had won. Yet nobody knew he was there. He went very quietly to peep into the garden, where he hoped to see Deruchette. There she was, but not alone. There was a stranger with her, who held her in his arms, and she seemed to love him. Poor Gilliatt saw this, and moved away without a word.

Nothing can describe Lethierry's delight next day when he realised that the precious engine of the Durande had been salved. He behaved like a man possessed. There was nothing too extravagant for him to say of Gilliatt. The man who saved the engine was to marry his Deruchette, and he meant it. But he did not know what Gilliatt had seen. He did not understand why the young fisherman said "No!"

And so it came about that Deruchette was married to the man whom Gilliatt saw with her in the garden. They sailed away from St. Sampson, and, standing on the deck to take a last look at the old town, she said to her husband:

"Look! It seems as if there were a man out there on that rock."

GILLIATT'S LAST SIGHT OF DERUCHETTE AND THE END OF IT ALL

There was, indeed, a man upon the rock, sitting motionless, as the vessel passed out from the harbour, and the man looked wistfully towards the lovely face of Deruchette. Many a time before had he sat in that same place. It was a sort of natural chair hollowed out of the rock by the action of the sea, and at high tide the water rose above it. Gilliatt, in the old dreamy days, had often sat there gazing out to sea, dreaming, until the rising tide warned him to be off. The water was rising now. The waves had reached the waist of the man when Deruchette drew her husband's attention to him. The water was now nearly level with his shoulders; but his eyes were fixed seaward on the diminishing vessel, and a strange light shone in their profound and tragic depths. One could read there the melancholy acceptance of an end far different from the dreams the man had cherished.

The vessel had become a mere speck now on the horizon, and when it vanished the head of Gilliatt disappeared altogether. Nothing now was visible but the far-gleaming sea.

The next Famous Books are on page 4325.

THE MAN WHO LOVED CHILDREN

CONTINUED FROM 4071

SCHOOL is a very bright and pleasant place in these days, and boys and girls are happy when they are at school; but this was not always the case. A hundred years ago most schools were dull and gloomy, and there was no attempt to make teaching and lessons so bright that children would look forward to them.

But here and there was a man who believed that lessons could be given in such a pleasant way that boys and girls would really love to be at school. One of these men was a Swiss named John Pestalozzi, and we all owe a great deal to him and to the way in which he gave his time and money and whole life for the great purpose he had at heart.

Pestalozzi loved children, and when he saw the misery in which most of the poor boys and girls of his native land lived, he determined to do something to help them to grow up good and useful men and women. He bought a farm, built a large dwelling-house, and, collecting fifty of the very poorest boys he could find in the roads and lanes, took them to live with him in his house, and taught them farming.

But Pestalozzi was not a very clever business man, and at the end of five years he had spent all his own and his wife's money in helping others, and had to give up the farm. But he had done a great deal for boys and girls, for he had shown that very poor children could be educated and trained to work, and though his own school failed, industrial schools similar to his are now found in every country. But it was not only his money that Pestalozzi gave freely to help boys and girls—he gave his whole life up to them. In 1798 the French army acted very cruelly in the canton of Unterwalden, and many poor children lost their parents. Pestalozzi at once left his family, and, gathering eighty of the poorest children into an old convent, taught them, played with them, and did everything he could to make their lives happy.

From morning to evening he was alone with them; everything they needed was provided by his hand; every help in time of need and all their teaching came from him. "My hand lay on their hand," he tells us, "my eye rested on their eye, my tears flowed with theirs, and my laughter accompanied theirs. They were with me and I was with them. Their soup was mine, their drink was mine. I had nothing—no housekeeper, no friend, no servants around me; I had them alone. Were they well, I stood in their midst; were they ill, I was at their side. I slept in the

middle of them. I was the last who went to bed at night, the first to rise in the morning. Even in bed I prayed and taught with them until they were asleep—they wished it to be so."

The picture on page 4177 shows how Pestalozzi gave himself up to the children, and how they loved him. But his life was full of disappointments, and after a year the convent was wanted by the French troops for a hospital, and the school was again broken up. Pestalozzi's life of love and self-denial was not lost. His work lives to-day in the many industrial schools for the poor, where boys and girls are taught useful trades that will fit them for the battle of life, and his labours are still bearing fruit in the better and more natural methods of teaching which are now found in every civilised country in the world.

THE BOYS WHO SAVED THE BOAT

A BRITISH warship, the Seringapatam, was anchored one August afternoon off Antigua, one of the Leeward Islands of the West Indies. As the weather was so fine, and the sea so calm, some of the officers thought a little cruise in the pinnace to a bay two miles distant would be a nice afternoon's excursion. This plan was carried out, but on the return the pinnace was becalmed.

In the tropical West Indian seas, a hurricane may burst without much warning, and suddenly a squall of wind upset the pinnace, but all in the boat were able to scramble on the gunwale.

Their position was one of much danger, for the boat was drifting seaward, and any moment the storm might be on them in all its severity; but worse than all were the dreaded sharks in the waters around.

Among the officers was a brave young midshipman, named Smith, who astonished his companions by declaring that he would swim ashore to get help.

"What!" they exclaimed. "Swim two miles in this sea, with sharks all around?"

"Yes," he persisted. "There is no other chance. Will one of you go with me? I believe I can do it."

But the men kept silence.

Then Smith's fellow midshipman, Palmer, not to be outdone in bravery, and unwilling to let his friend risk his life alone, though he was a very indifferent swimmer, and far from strong, said that he would swim with him as far as he could.

So the two boys cast off their shoes, caps, and jackets, and, taking leave of their companions, plunged into the sea and struck out for the shore.

At first they made good progress, but it was soon apparent to the men watching them that Smith was making greater headway than Palmer. All the time Smith was on the look-out for sharks, and at last, down in the deep clear water below him, he saw two particularly large ones swimming along.

When the boys had covered about half the distance, Palmer, whose strokes had been getting weaker, called out:

"I'm done. Go on, Smith."

But Smith was not the boy to desert a plucky friend; instead, he urged him to rest an arm on his shoulder awhile.

This Palmer did, and so got relief, though both boys continued to use their feet, lest the sharks should be after them. These creatures were plainly visible now, but, possibly because the boys wore dark suits and continued moving all the time, they were not attacked. The stronger boy did all he could to keep up the spirits and strength of his friend, who was by now almost exhausted.

The last few yards were very difficult, but just in time, and after swimming for two hours, Smith felt ground under his feet, and dragged his helpless companion up on to the beach.

They were safe, but there were the men in the boat still to be rescued. Smith ran to the nearest village and gave the alarm. Two boats were manned and sent out, but by this time it was nearly dark and rain fell in torrents, so that hours were spent in searching for the overturned pinnace. Boats were also launched from the Seringapatam to find the pinnace, and at last it was discovered six miles away.

The two brave boys were presented with silver medals by the Royal Humane Society, and some time after Smith gained another medal for rescuing two men who fell overboard.

The next Golden Deeds are on page 4333.

If the sun's rays be passed through a slab of ice shaped like a burning-glass, the heat waves retain their heat although the ice is so cold, and they will light a fire of paper and wood, as shown here.

DIFFERENT KINDS OF HEAT

CONTINUED FROM 4052

We have discussed the first great fact about heat, which is that it is a particular kind of motion of the particles of matter, and therefore we must be able to imagine that matter might exist without this motion—that is, absolutely cold. This discovery of the nature of heat is one of the great discoveries of modern knowledge.

But now many of us who have read so far will want to ask a very serious question, because we see very well that either something has been missed out from what we are saying, or else words are being used with very mixed-up meanings. What we ought to ask ourselves is this: Seeing that heat is a particular kind of motion in matter, and that when we get outside our ocean of air there is no matter between us and the sun, what is that heat which the sun sends us?

The reason for the difficulty, as we have already mentioned, is that the word heat is being used with mixed-up meanings. When we look at the facts, we shall see that there is much excuse for the confusion, but still it is a confusion. We have to admit at once that the word heat is used for two different things—first, for a particular kind of to-and-fro motion in matter; and, second, for a particular kind of wave in the ether. So now, before we go on to any details, let us look in a general way at this other kind of heat, as we have done in the case of the first kind of heat. The rest will be all plain enough if we get right ideas at the start. For the moment, let us quite forget what we know about the heat which is a motion in matter; or, if we do not forget, let us assume that the word heat is now being used as a quite different word.

Everywhere there is the ether. Throughout all space, whether matter is there or not, there is the ether, that can be thrown into waves. These waves are of different shapes and sizes, but they are all of the same nature, and all travel through the ether at the same rate. Different parts of our bodies pick out certain sets of these waves, and then we call them by special names. For instance, our eyes pick out a group—not a very large group—of these waves, and see them; those waves, then, we call light waves.

Close to them in the great scale of ether waves are others, really of just the same kind, which, as it happens, our eyes are unable to see, and which, therefore, we do not call light. But other parts of our body can feel them, and the feeling they give us is one of warmth,

or heat. So we call them heat waves. If we use the modern term, which is being employed more and more, we shall say that the ether conveys *radiations*. In the mighty scale of the ether radiations, which we may compare with a series of notes on a piano, the heat radiations lie just below the light radiations. The two are in all essentials the same; they differ only as one octave on a piano differs from an octave next to it. Radiant heat and radiant light both travel through the ether at exactly the same speed—namely, about 186,000 miles a second. They come together to us from the sun.

SOMETHING THAT THE THERMOMETER CAN FEEL WHICH OUR EYES CANNOT SEE

It is possible to spread out the radiations from the sun by passing them through a prism—a three-sided piece of glass. When this happens, the radiations are all spread out in their proper order, and if we take a thermometer it is very easy to show that on one side of the patch of light which passes through the prism, and in the darkness just beyond it, there is something which our eyes cannot see, but which the mercury in the thermometer can feel, so to speak, and that is the radiant heat coming from the sun.

Now, we shall best understand the uses of the word heat, and the way in which things really happen, if we trace the course of things from the sun, say, to our own skin, when the sun's warm rays fall upon our faces. Let us suppose, for the moment, that we are blind, or have our eyes shut; we are not to consider the light waves at all, but only the heat waves.

The sun is made of matter; and the matter of the sun, like all other matter, is made of atoms and molecules. These, in the case of the sun, are intensely hot. We should have to represent their temperature at thousands of degrees.

MOVING ATOMS IN THE SUN THAT CAN KILL A MAN ON THE EARTH

Now, we already know what this means. It is that the atoms and molecules of the sun are moving very quickly to and fro in a special way which makes heat. The question is: How does that movement, more than ninety millions of miles away, affect us? For, walking on the earth, we may be actually killed by sunstroke, because at that immense distance certain atoms and molecules are moving very quickly backwards and forwards. This can be explained, and the explanation applies equally to the case of the sun, or to the case of a warm fire which sends across the room heat that we can feel.

We are to remember that the ether is everywhere. Let us for the moment think of it as an ocean in which everything is buried—the sun and the earth, and everything else. Now, the atoms and molecules in the sun or in the fire, as they move quickly to and fro in this ocean of ether, may very well start waves in it, just as a fish's tail would start waves in water. And those waves are the radiant heat which travels through millions of miles in the ether from the sun in every direction equally, and of which a very tiny proportion is caught by the earth and the people upon it.

Fortunately for us, before these powerful rays reach us, a very great quantity of them is stopped and kept by the atoms and molecules of the air which floats above us. None of us could possibly survive the sun's glare if there were not an ocean of air above us to catch a great deal of it.

THE WAVES OF ETHER FROM THE SUN THAT GIVE US HEAT

Now, what happens when the air, or anything at the bottom of the air, such as a stone or a sheet of water, receives these rays from the sun? The wave has travelled through the ether from the matter which made it, and has struck other matter. In that matter it produces the same kind of motion as that which made it in the first place, and so the heat of the matter of the sun produces heat in the matter of the earth.

It has probably not been pointed out before how close is the parallel between what happens in this case and in the case of the telephone. When we speak into the telephone, certain to-and-fro motions are made in the matter there, which we call the drum. These motions do not run along the wire, but they produce in the wire an electrical wave which is not really a wave in the wire at all, but in the ether in the wire, and which is really of the same kind as a wave of light or of radiant heat. At the other end of the telephone there is another drum, which is made to vibrate to and fro like the drum into which the words are spoken.

Just in the same way, the ether waves that are started by the hot matter of the sun strike the matter upon the earth, with the result which we call heat. We have a very good instance of this when we use a burning-glass. We know that if we have a rounded piece of glass, we can make it throw a bright spot upon a piece of paper, and that we can even cause the paper to burn in that way. The glass has acted not only upon the light waves, which we can see, but upon the heat waves, which we cannot see; and when the paper is thus heated to a sufficient degree, it combines with the oxygen of the air, and we say that it burns.

In these last sentences, the word heat has been used in its two senses; but we have now studied the subject far enough not to be confused, and we understand the very great and complete difference there is between that special motion of the atoms of the paper which we call heat, and those waves of the ether which are a kind of invisible light, and travel through millions of miles of space where there is no matter.

THE KIND OF HEAT THAT MOVES IN MATTER IN TWO DIFFERENT WAYS

Here, it is not necessary to say any more about radiant heat; but of course we shall have to refer to the important subject again when we come to study light. Now let us go back to the heat which is a motion in the atoms or molecules of matter, and which might indeed, to distinguish it, be called atomic or molecular heat.

This kind of heat, as we have all observed for ourselves, can travel about in two ways, and now that we know what it is, there is no difficulty at all in understanding how it travels. Let us take the case of the water in a kettle which is being heated.

We can imagine the special kind of motion called heat being imparted to the molecules of water that lie nearest the bottom of the kettle. It may then be, as indeed it is, that these molecules rise to the surface of the water, and as they rise of course they carry with them their heat. Now the heat which was applied to the under surface of the water has reached its upper surface. It has been bodily carried, so to speak, through the water; and when heat is carried in this way we say that this is a case of *convection*. This is an uncommon but quite simple word, if we remember the word vehicle. These two words come from the Latin *veho*, I carry; and so convection, or "carrying with," exactly expresses the way in which heat travels when hot particles moving about from one place to another carry their heat with them.

MATTER THAT CARRIES ITS HEAT AS A BEE CARRIES ITS BUZZING

We may think of this, perhaps, if we care to, as like the case of a buzzing insect. The buzzing and humming are due to the vibration of its wings, and as it flies about it carries the buzzing and humming with it. So we may think of the molecules of matter as buzzing. That buzzing is their heat, and when they travel of course they carry it with them. If we think of it in this way, we shall not be confused when, in a little while, we go on to study another way in which heat travels.

Convection of heat is an extremely important subject in our lives, and in the Story of the Earth. We understand, of course, that it applies only to fluids—that is to say, liquids and gases. In them the matter is flowing, and so it can carry its heat with it; but in anything solid the atoms and molecules are staying in their places, even though they may be very hot and vibrating to and fro very quickly in their places. So no convection of heat occurs in solid bodies, but in all fluids convection currents are practically always going on. This well-known fact works out in a thousand different ways.

HOW OCEAN CURRENTS AND THE CURRENTS OF AIR ARE CAUSED BY HEAT

In the case of the water in the kettle, the heated water rises. It does this because heated water is lighter than cold water. Therefore, by heating one part of the body of the water, we can set the whole body of the water moving, and this applies not only to the kettle, but also to the oceans. It applies equally to other fluids, such as the atmosphere. In all the water of the earth, and in the earth's great coat of air, different parts are at different times heated more or less than other parts, and so convection currents are started. The results are very important, not

only because heat is carried about from place to place, but because the matter carrying the heat is also moving about. In this way great ocean currents, and also great air currents, which we call winds, are started. There are constantly going on, for instance, what are called the trade winds, so called because in the old days, when ships were driven by the wind, the ocean trade of the world largely depended upon them. These trade winds depend entirely upon the laws of heat which we are now studying. If we think of the earth as a whole, we shall see that the tropics, being more directly exposed to the sun, are heated more than the temperate zones.

The air of the tropics, then, being heated and made light, ascends, carrying with it its heat. But as it ascends it leaves a space beneath it, and that space is filled by colder and heavier air flowing in to take its place. So there is set up a wind blowing from the north towards the tropics, and a wind blowing from the south towards the tropics. If the earth did not spin, these winds would be due north and south; but the earth is spinning, and any point at the tropics is moving round much faster than any point in either of the two temperate zones.

THE MEETING OF THE WINDS THAT USED TO CARRY THE TRADING SHIPS ALONG

This means that the apparent direction of the wind is altered, owing to the spinning of the earth, and, in consequence, the trade winds are not north and south, but in the northern hemisphere they are north-east, and in the southern hemisphere they are south-east. The two winds meet along a belt round the middle of the earth, and in the old days when ships got into this belt, where the two winds meet and cancel each other, so to say, sailors might be becalmed for long periods of time. The trade winds, though at one time important, are of practically no importance now, but the study of them in relation to the laws of heat is very interesting.

Now let us consider this law of heat as it affects the ocean. Here is a fluid of which the different parts can move freely, and they will carry their heat with them by what we have learnt to call convection. The hotter water will rise because it is lighter, and cold water, which is heavier, will flow in underneath it, just exactly as we have seen in the case of the trade winds, in that other ocean which we call the air.

The consequences in the case of the ocean of water are very important, for the laws of heat so work out in this case that cold water, which was near the surface in the Polar or even the temperate regions of the earth, but especially in the Polar regions, travels towards the warmer regions of the earth, but is compelled to sink as it does so, having above it the warmer water, which has been exposed to the heat of the sun in the far warmer zones.

THE EVER-MOVING STREAM OF COLD WATER THAT GIVES LIFE TO THE OCEAN

Thus, in the great circulation of water on the earth which is always going on, we have to think of something rather like running a stream of cold water into one end of a bath filled with hot water. The cold water simply creeps along the bottom. Now, that is what happens in the case of the ocean, and the enormous importance of this fact is that the life of the deep-sea fishes, and the life—animal and vegetable—everywhere covering the ocean floor, depend entirely for their existence upon this stream of cold water. When it was at the surface it obtained oxygen, and that oxygen, which it carries to the depths, sustains all the life there.

One more instance of the convection of heat is, perhaps, the most interesting, and is certainly, in some ways, the most important of all. It is not to be found in any of the ordinary books on this subject, perhaps because most of the people who study these subjects confine themselves to studying only one view of them. If we examine our own bodies, or the body of any warm-blooded animal, we find that their temperature, or warmness, as we may say, is nearly the same at all parts.

THE BLOOD THAT MOVES IN OUR VEINS AS WATER MOVES IN THE SEA

Now, we know that the heat is not made in, for instance, the hands or the feet, but only in certain organs in the inside of the body, and in the large muscles when they are thrown into action. How, then, is the heat distributed, so that the whole body is kept warm? The answer is that the circulation of the blood, wonderful in a hundred other respects, also supplies a beautiful

instance of the convection of heat. The outlying parts of the body could not be kept nearly warm enough without this process of convection, for they lose heat to the outside world far more quickly than it could be received by that process. But the blood, which rapidly travels throughout the whole body without ceasing, carries to the surface and the limbs and other exposed parts, such as the ears, not only oxygen and food, but also heat, and then, as it flows through the small blood-vessels in these parts, the heat which has been bodily carried there by the blood leaks through into the tissues and keeps them comfortably warm.

HEAT THAT IS ALWAYS PASSING TO AND FRO BETWEEN DIFFERENT THINGS

Now that we perfectly understand the convection of heat, we can go on to study another of the very important ways in which it travels, and that is what is called *conduction*. The conduction of heat occurs in all circumstances, in solids, liquids, and gases, from solids to liquids, from gases to solids, and so on.

It is the constant law, true everywhere and always, that, whenever one thing is hotter than another, heat will flow from the hotter to the colder. Just as we say that water must find its own level, because of the constant action of the earth's gravitation, so we may compare heat with water, and say that it must find its own level. The constant tendency of heat everywhere is to make its level equal. Every portion of matter everywhere which is hotter than its surroundings must lose heat to them, just as a river must run downhill.

HOW A ROW OF BOYS CAN SHOW THE WAYS IN WHICH HEAT TRAVELS

Now, we must first understand what conduction actually is, and how it differs from convection. In conduction, the heat is passed on, or conducted, but the matter which contained it stays where it was. It is like a row of boys in which each one is slapping the next; whereas, in convection, the boys would change places and take their slaps with them. If we remember what heat is, we can begin to imagine how the buzzing, or vibration, of the atoms at one end of a poker might start the atoms farther along vibrating also in the same way, and so the buzzing, or heat, would be conducted along the poker. It is not possible to go more deeply into the nature of conduction than this, because we really do not know how the atoms or molecules of matter are held together, in a poker or in anything else.

But we can, at any rate, study conduction in many ways, and the first thing we find is that different kinds of matter vary enormously in their conduction of heat.

Everyone knows that one end of the poker becomes hot when the other end is held to the fire. Yet one end of a piece of firewood may be so hot as to be actually burning, and the other end quite cool, though the stick is far shorter than the poker. The metals in general are very good conductors of heat, as the iron of the poker suggests. On the other hand, tissues made by living things are very bad conductors of heat. Wood is such a tissue, though we do not always think of it as if it were, and we have noticed how badly it conducts heat. Bone, also, and wool and silk, and even linen and cotton, always conduct heat very badly.

WHY IT IS NECESSARY FOR THE BLOOD TO CIRCULATE IN OUR VEINS

This general fact about the tissues of living things shows us how necessary it is for the circulation of the blood to play the part we have just studied, for our bodies are such bad conductors of heat that the heat made in the liver and muscles could not keep the whole body warm if it were not that convection is called in to the aid of conduction—first, we have quick convection by the blood, and then we have conduction through the finest blood-vessels to the tissues.

Though we have to rank the group of the metals as good conductors, yet even among themselves they vary a good deal. Those which conduct heat best are those which conduct electricity best—for instance, copper and silver. The fact that living tissues conduct heat badly is by no means a disadvantage; it is of the greatest importance to all warm-blooded animals that they are able to produce, by the life that is in them, special kinds of tissue which conduct heat very badly, and with which they clothe themselves.

The next part of this is on page 4319.

THE OX EYE DAISY

This is one of the most showy members of the daisy family, the flowers being something like those of the May-weed, but much larger. The ox-eye daisy is a favourite with children, who string the flower-heads together. It is a member of the chrysanthemum family.

THE YELLOW TOAD-FLAX

The flower of the toad-flax is in shape very much like the snapdragon of our gardens, but, unlike that plant, it has a long spur, or tail, projecting from its base. The deep yellow flowers are responsible for the other name of butter-and-eggs often given to the toad-flax.

THE WILD CARROT

It is from this plant that the fine carrots of our tables have been developed. When the fruit succeeds the white blossoms, the flower-heads become shaped like curious hollow cups, and are then called bird's nests.

THE COMMON RAGWORT

This flower seems to grow everywhere, and blooms in the late summer and the autumn. Its golden stars produce many seeds, and the plant spreads very rapidly. It is a close relative of the groundsel.

ROADSIDE PLANTS AND WEEDS

BY HELEN INGERSOLL

If dirt is matter out of place then weeds may be considered to be plants out of their proper places. There are many herbs that grow in an unobtrusive manner in their native country, but when transplanted to foreign shores overrun the waysides and fields, and choke out the flowers that belong there. Others seem to be troublesome to farmers wherever they may be, sturdy plants capable of surviving all kinds of ill-treatment and ready to seize any chance of bettering themselves.

Our roadside weeds, and the pests of the cultivated fields, have often come to us from abroad. They travel here in various ways; plants, brought over as keepsakes from old gardens, have sent their seeds broadcast, or have spread by runners; seeds have been brought in with imported seed-grains and have spilled from vehicles, or been unknowingly sown; burrs and other fruits have clung to wool and hides; and in a hundred secret ways, the weeds have crept in and humbly or arrogantly fought for a living. Once here birds and beasts distribute them. Most of the weeds are so common that a mere glance at the pictures will discover some that we know. We shall soon notice, moreover, that many of them belong to that great order of campanules, which includes not only the lovely bell-flowers, but three great families, the chicory-tribe, the rag-weeds, and the asters.

Perhaps this may be explained by the fact that the last three families have fruits, called achenes, that are small and dry, and contain each one seed inseparably wrapped in the tube of the flower's calyx. The sepals are deformed and now appear as teeth, or scales, or bristles, hard or soft, or as stiff prickle-like objects called arils. These form what is called a pappus, and it may also take the shape of a little cup or crown. Sometimes it is not present at all. This curious development of the seed-vessels and calyx has gradually been brought about, in most cases, to furnish each fruit a means of travelling. For each little seedling may find much better soil or conditions for growing in some other part of the field, let us say, than in the special corner where its parent grew. A study of weeds, therefore, includes a study of the seeds and, although the farmer finds this seed-study useful for finding weed-fruits and destroying them, we shall discover all sorts of interesting methods that

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have arisen for carrying seeds abroad.

THE DANDELION

We have all taken a puff or two at the soft globes of a ripe dandelion head to see what o'clock it is. In a little cloud the down flies away, leaving only one or two plumes sticking to the disk on top of the stem. Let us forbear to blow these away and look at them closely instead. We shall promptly see a little spindle-shaped achene topped with a slender stem bearing a tuft of downy bristles. Pouf! Away it goes, lighter than air, the tuft of down carrying the achene swinging beneath it far afield, springing in the eddies of the breeze until it strikes a tall bush, or the wind drops and the parachute falls to the earth, and the pointed end sticks in. It has barbs, which prevent its blowing out again, and the parachute, having served its purpose, soon perishes. If in suitable soil (and nearly every soil is suitable for a dandelion), dust blows over it, or it sinks into a tiny crevice in the ground, and the early rains start it into growth.

It will continue to grow all summer, gradually choking out the grass in its vicinity by covering it with the deeply-jagged leaves, which it arranges in a flat tuft of circular outline, like many other pasture plants. In this way it may escape being clipped by the teeth of browsing cattle. The dandelion does not hug the ground so closely as other weeds, but it is provided with a milky juice so bitter that no animal wants to taste it more than once. Oddly enough this very bitterness recommends the plants to *us* as a spring salad.

By fall the dandelion has grown large and strong, and has stored much starchy nutriment in its firmly-fastened root. Even its flower-heads are pretty well developed, ready to bloom into golden buttons during a warm spell. But then it is in danger again, for the root yields a drug, and is therefore dug up.

THE CHICORY

Very closely allied to the dandelion is the chicory, bearing flowers azure blue when newly opened, but often fading to pink, and sometimes occurring in a white variety. Apart from its jagged root-leaves, the chicory is very different from the dandelion in appearance. It is tall and ungainly, the branches striking out at various angles. The foliage is gray-green and scanty, and generally dusty, for the chicory haunts roadsides and waste lands. Clustered in groups on the bare stems, at awkward intervals, are the flat heads nearly two inches across, setting close to the branches. They open wide when the sun shines, but towards sundown, or if rain seems likely to fall, close by raising the rays until these stand in a close group over the centre of the flower. This is in order to protect the precious pollen that is placed in a perilous position by heavy dampness. Each floweret, tubular at the base, is prolonged on one side into a long, strap-like ray, which sticks out not unlike a tongue, and is called a ligule. Each ligule extends over a flower in an outer row and shelters it. A ring of five anthers with stamens united stands in the tube of the floweret, and very quickly pollen is discharged through the inner slits of these anthers, filling up the tube, over the young pistil. The style of this pistil, however, when the pollen is freed, begins to grow, and as it grows it pushes the pollen up until it is piled about the opening of the tube, where rain would soon destroy it. During the closing process that we have described, the flowerets are of course brought closely together and become fertilised by actual contact, which is made very sure by having the inner rays shorter than those of the outer circles, so that the "tongues" do not get in the way. Moreover, the stigmas of the outer rings mature before those of the inner. This is because when the floweret commences to fade, as happens just at the outer edge of the head, the branches of the style, that have been shut close together while the pistil pushed through the tube, begin to spread over and curve downwards, and so expose the inner stigmatic surface, hitherto concealed, ready to pick up the pollen.

With slight differences, this description of the method of fertilisation will answer as well for the dandelion, as for the chicory, the mouse-eared hawkweed

THE WILD CHICORY

The chicory, or succory, is an attractive flower, something like a dandelion in size and shape, but lilac-blue in colour instead of yellow. The root is roasted to use with coffee.

THE COMMON DANDELION

This is the real dandelion, although that name is given to other flowers. What we call the flower is really a bunch of flowers. The dandelion is valuable as medicine.

THE SPEAR PLUME THISTLE

Despite the contempt that attaches to the name of thistle, we must all agree that the spear plume thistle, when it grows four or five feet high, and is crowned with its purple flower-heads, is really an ornament to the field. It is commonly found in a lane-corner or beside a rock.

THE COMMON SOW-THISTLE

The name sow-thistle has nothing whatever to do with the sow, but is from a Greek word meaning hollow, referring to the stems. The plant is a very favourite food for rabbits. It is also called the milkthistle, because of the milky juice that there is inside the stem.

and the sow-thistle, that we shall next consider.

THE MOUSE-EARED HAWKWEED

The pale yellow flower-heads of the mouse-eared hawkweed, poised solitary on slender stalks, are not unlike those of the dandelion, but the soft, oblong, or spatulate leaves, felted beneath with star-shaped hairs, are very different. It has drifted over here from Europe, and is a prostrate, mat-like herb, that sends long stems running over the ground, taking root at short intervals. It is a bad pest in parts of North America, like certain other allied species.

THE ORANGE HAWKWEED

The orange hawkweed, or devil's paint-brush, that sends up a corymb of flame-coloured flower-heads, is very striking but also has runners and small seeds that, borne by a tuft of dusky white bristles, whisk into rich pastures, and land that cannot be ploughed, soon smothering the grasses with their useless but abundant foliage. Oddly enough, it is a very near relative of several of our own woodland plants, the rattlesnake-weeds, that meekly stay in the copses, and do not overrun the fields as the imported species do.

THE COMMON SOW-THISTLE

A striking weed, shooting up to a man's height, is the common sow-thistle or hare's-lettuce, topped with small, pale dandelion-like flowers, exuding a milky, sticky juice wherever bruised, and with a spire-like effect caused by the graduation in size of the foliage from the large leaves of the base to narrow clasping ones at the top. It is fortunately an annual, haunting gardens and stubble-fields. Towards the end of summer, the tall plant is fairly veiled in the whitish heads of the fruit, each with a tuft of soft pappus-bristles. They cling to one's clothes and to weeds, and blow away in groups.

THE BRANCHING GROUNDSEL

The little branching groundsel has small tassels of greenish flowers that look as if the rays had all fallen away. As a matter of fact, however, they never had any, but the plant nevertheless manages to perfect its seeds, with their little tufts, and send them far afield, landing by preference in gardens.

THE RAGWORT

A very close relative to the groundsel, the ragwort, is a thick-rooted perennial, short-lived, fortunately, for it is declared to cause an odd but fatal disease of the liver in cattle when eaten by them. The old name staggerwort may refer to this. It is a tall, coarse plant bearing deeply twice-pinnatified leaves, the segments waving over and under each other, very close-set and dark-green in hue. Heavy, showy corymbs of golden-yellow flat flowers, with toothed rays, terminate the stalks. The seeds have a soft white pappus.

THE SPEAR-THISTLE

Although we may have idly noticed that the spear-thistle is apt to be growing in a fence-corner, or beside a rock, we have probably never even wondered why. It is a striking plant with stems armed with spiny ridges, the mid-veins of the leaves running down them, and with equally prickly foliage ending in a long spear-like point. The purple flower-heads are large and handsome. Although composites, the thistle-heads have no rays. They are simply tufts of slender tubular florets, that are soon displaced by the achenes and the soft white thistle-down, which are both so attractive to the lovely little goldfinches, who eat the one, unalarmed by the spines, and line their nests with the other. Each large achene, when the scales open slightly, and allow it to escape, floats away supported by its parachute of plumy bristles. There are two other very common weeds which have no pappus whatever.

THE OX-EYE DAISY

We have all seen the sheets of white bloom that cover badly-tilled or neglected pastures, where the ox-eye daisy is in flower. White-weed the farmer calls the tall strong-smelling plant that chokes out the grass in his hay meadows, and is despised by cattle. Yet it is a member of our cherished chrysanthemum tribe and is surely very handsome with its pure-white petals, that children pick off, one by one, to see just whom they are to marry — "Poor man, rich man, beggerman, thief."

The yarrow, that pretty roadside plant with very finely divided, fern-like leaves,

THE MOUSE EARED HAWK WEED

This plant is sometimes mistaken for the dandelion by those who are not botanists, its yellow flower-heads being something like the dandelion's flowers.

THE COMMON GROUNDSEL

This is a member of the daisy family, and is one of the most widely found plants in the temperate regions, owing to the fluffy seeds being carried everywhere by the wind.

THE COMMON BURDOCK

This plant, with its balls of green bristles surrounding the flowers, is known to all boys, because each bristle is furnished with a hook, and when the bristly heads are thrown at anyone they cling to his clothes.

THE COMMON YARROW, OR MILFOIL

The yarrow is one of our commonest wild plants, and its flowers, that grow in dense clusters at the ends of the stems, vary from white to pink. The name is a corruption of ye arrow, a reference to the shape of the leaves.

is not a very noxious weed, although it is likely to give a bitter taste and strong odour to milk. It also furnishes a stimulant drug. The flower-heads, in flat-topped clusters, have greenish-white disk flowers, rather an unusual colour, and white rays, and the achenes are flat and oblong.

THE BURDOCK

Another composite which we have not always realised, perhaps, to be the cousin of the thistle and groundsel, has gone a step further in the utilisation of its protective bracts, forming the involucre about the base of its globular heads of purple, tube-shaped flowers. The involucre itself is almost ball-shaped, the flowerets protruding from the top; and the closely over-lapping bracts are stiff and shaped like a lance prolonged into long spines that are spreading or are hooked at the tip. This is the burdock, a plant of dock-like appearance, and with fruits like burrs. One can easily imagine, from one's struggles with the burrs that have become entangled in the clothing, how far the " burrs " would be carried when firmly fastened in the woolly coat of a sheep, or the long hairs of a cow's or dog's coat. The burdock therefore becomes a common roadside and waste-land weed. It has its uses, however; the long tapering root furnishing a medicine for blood and skin diseases, while the great, fresh leaves form a cooling poultice for ulcers.

THE WILD CARROT

At last we may leave the composite family, and proceed to the umbel-bearers, in which we shall find one conspicuous plant, the wild carrot, which we should doubtless admire very much if it were not so common. Queen Anne's Lace, the English children call the large disks of tiny white flowerets, poised on slender stems. The outer ones have their petals enlarged on the outer side to make the umbel more showy. And always in the centre of the whorls is a maroon-coloured floweret, — why, no one can tell. The finely cut leaves are as graceful as fern-fronds. This is the plant from which our garden carrot has been developed by the gardener's patience. At night, the umbel nods, to protect its flowerets, and when time ripens the seeds, the ribs curve inwards, and the flower-head becomes a ball, — a small tumble-weed that breaks off from the stem and is whirled over the snow to pile up in a corner and shed its seeds with those of other refugees.

BUTTER-AND-EGGS

Growing with, or under, the wild carrot is the butter-and-eggs. In England, however, people will persist in regarding it as the snapdragon. It is the common toad-flax, so called because its leaves are long and narrow, like those of the flax, and the closed lips of the flower are thought to resemble the muzzle of a toad. It is a bright, clear yellow, and the lips are marked with deeper yellow or orange to show the bee where it opens to admit her in her search for honey. Her weight, as she alights upon a pair of knobs bulging from the lip, forces it down; and as she pushes into the flower she rubs under two pairs of large stamens arching under the upper lip, and drags out of them round balls of pollen.

Smaller insects cannot press this flower open. The flowers are crowded at the upper part of the stems, thus adding to their showiness, but, even before the plant comes into flower, its numerous narrow leaves, of a whitish-green colour, make it look very pretty. Sometimes the five topmost buds of the raceme unite in order to form a monstrous flower of regular form with five spurs.

THE BUTTERCUPS

We can scarcely cross a meadow at any time of the year without finding a few buttercups, but it is in spring and early summer that we find them well in flower. There is a general idea that the name of these plants is due to the shape of the flower; but the old English spelling was *buttercop*, and cop meant a stud or button.

Now there are many kinds of buttercup in the crowfoot family, and it is very interesting to search for them and note the differences between them. One of the earliest to flower is the meadow buttercup. It is an erect plant with large stalked leaves, nearly round or five-sided in general outline, but divided

THE MEADOW BUTTERCUP

There are many kinds of buttercups, and this one is found in all our meadows. The flowers are called bachelor's buttons. The French name means golden buttons.

THE YELLOW MELILOT

This plant belongs to the pea family, and is very dainty and graceful with its pale yellow flowers. When drying, it smells like new hay, and was once much used for fodder.

THE WILD MUSTARD

The wild mustard, or charlock, is a pretty sight for the tourist, but it is a great nuisance to the farmer. It covers his fields with a waving sheet of yellow blossoms that have to be uprooted by hand. It is covered with rough bristles.

THE SHEPHERD'S PURSE

This is one of the commonest of weeds, and is to be found almost everywhere that man has gone. It is called shepherd's purse because the seed-vessel is like a little pouch, and shepherds used it as a charm, believing that it saved their sheep from wolves.

into five or more parts, and each part is cut into several broad teeth. The leaves on the branched, flowering stem are simpler in form, less divided, and without stalks. The flowers on one plant are very numerous, and both sepals and petals spread wide and flat so that the flower is more saucer-shaped than cup-shaped. It is common and has been introduced from Europe. There is one odd thing about the tribe of buttercups, — the honey is secreted in a tiny depression at the base of each golden petal and is there protected by a little scale.

THE SHEPHERD'S PURSE

In the mustard family we find two weeds so unlike that we should find it hard to believe in their close relationship were it not for the four petals in the shape of a Maltese cross.

One of them, the shepherd's purse, with a rosette of narrow deeply-lobed leaves and tiny white flowers, differs greatly from the much larger charlocks in the shape of its seed-pods. These are flat and heart-shaped, and split down the middle to set the seeds free. Old-fashioned purses were shaped like this, and opened in a similar way, so we can easily guess how the plant got its name. These purses stand erect on their little footstalks. Its winter rosettes crowd out grass and clover, and a single plant will ripen 50,000 seeds, so in spite of its small size it is to be dreaded in meadows as well as gardens.

THE CHARLOCK

In May, and less abundantly in later months, we shall find ill-tended lands all golden with the bright yellow flowers of the charlock, an annual of the cross-bearing family that is cordially disliked by the farmer. It is covered with rough bristles, and its leaves have their edges cut into bold teeth of several sizes. It has long, slender seed-pods containing a single row of dark brown seeds. In some places it is known as wild mustard.

THE BINDWEED

The pretty bindweed is a pest that is very hard to kill, since it persists in an unbelievable manner owing to the vitality of its fleshy rootstocks. It trails along the ground or winds up the grain-stalks. Its large, brown seeds, like those of the cultivated morning-glory, in whose family it belongs, should be taken out of grain before it is sowed.

CHICKWEED AND CORNCOCKLE

In the pink family we have two very unlike plants. One is the humble and persistent chickweed, whose tiny white flowers open during practically the whole year. The other is the tall corncockle, with decoratively designed, pale-magenta blossoms, with characteristic radiating lines on their heart-shaped petals and long pointed calyx-lobes that form a green star beneath the flower. It has slender-jointed, hard, round stems with narrow lance-shaped leaves in pairs; the whole plant is covered with white, woolly hairs, even to the long points of the calyx.

Although the petals spread out so broadly that the flower may be as much as two inches across, we can see by pulling them out that they grow very slender at the base, and are called "claws." The flowers are self-fertilised, after allowing insects to visit them, by the elongation of the stamens until they come in contact with the several stigmas. The resulting fruit is a swollen capsule filled with little black seeds, somewhat triangular in shape and bearing rows of teeth. These capsules are often discovered in grain, and should be cast out, for they not only discolour the flour, but render it unwholesome, being poisonous. Cheap, poor flour containing cockle-seeds, when fed to poultry or other animals, causes either a quick death or one resulting later from a chronic disease.

THE BLACK NIGHTSHADE

Among our poisonous plants we must not forget the black nightshade, another member of that dangerous potato family. It is a weak little herb, delighting in damp shady places, with wavy-edged ovate leaves, drooping clusters of small white flowers like those of the potato, and tempting, juicy, round, black berries. It is poisonous in every part, even small browsing animals being affected, and is therefore a very bad thing for youngsters to nibble.

THE NEXT STORY OF PLANTS IS ON PAGE 4285.

THE CORN-COCKLE

The rich crimson-purple flowers of the corn-cockle, measuring about two inches across, are very conspicuous in our cornfields from June to September. The plant itself grows four or five feet high, and the stems, on which the flowers grow singly, are covered with hairs.

THE FIELD CONVOLVULUS

It seems a pity that the pretty little field convolvulus, or bindweed, that is so common in our cornfields and other cultivated ground, should be a dangerous pest to armers and gardeners, strangling almost everything that it twines round as it climbs.

THE COMMON CHICKWEED

The chickweed flowers from spring to autumn, but it is a straggling, untidy plant. It thrives well in a garden, where we do not want it. Canaries like the seeds.

THE BLACK NIGHTSHADE

This is a very dangerous plant to meddle with, for the green parts are poisonous and the purple-black berries are very injurious to children. The flowers are white.

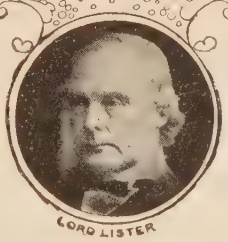
THE FATHERS OF MEDICAL SCIENCE

Hippocrates, the most distinguished of the old Greek physicians, is called "the father of medical science," because he taught the need of thoroughly studying the symptoms of a disease before attempting to cure it. Artaxerxes, the King of Persia, offered Hippocrates great rewards to come to Persia, but he refused to leave Greece.

William Harvey, the physician to King Charles I., has, like Hippocrates, been called "the father of medical science," because he first discovered and proved the double circulation of the blood, about which we can read in that part of this book that begins on page 1579. Here we see Harvey explaining his great discovery to Charles I.

THE WORLD'S GREAT DOCTORS

CONTINUED FROM 4107



No lives have been more important to the well-being of the world than the lives of the great surgeons and physicians. Without these men the human race must have been very much reduced by the many diseases fatal to man. Even to-day, in spite of science, pestilence carries off millions of people every year in India and elsewhere. But for the skill of the doctors, similar conditions would prevail throughout the world. If Europe had a death-rate as high as that of India, the land would be an empty wilderness in the course of a few years, as the birth-rate in Europe is smaller than in India. Our doctors not only cure us when we are ill; they teach us to observe laws which, if followed, will, generally speaking, keep us healthy.

How, then, we may ask, did men manage to live when there were no doctors? The answer is that there never was a time in the history of man when there were no doctors. We have no written books to tell us about the doctors of the old-time savages, but, nevertheless, the story is written for us in the bones of these men that have been found. Remains of men who lived thousands and thousands of years ago show us that many of these men sustained dreadful injuries, and that the doctors of those times quite cured their hurts. Skulls have been discovered from which damaged bone has been removed and new bone put in. A surgeon is able to tell at a glance whether the operation was successful. He finds the new bone knitted to the old, and knows that the surgeon succeeded in his task. But we find many other examples of operations which were not successful; the unknitted bone shows that the patient died, in spite of the attempts of his doctor. We find not only broken heads that have been cured, but bones which show that injured arms and legs were cut off by rough flint implements, and were healed in spite of the very crude treatment received.

What a wonderful story of the past these signs tell us. Men were savages, living by battle with the beasts and by battle with one another. Their lives must have been desperately hard and cruel. Injuries to bones which we are able to say were those of women show that the women of savage days shared the battles of the men, and were hurt as badly. The men and women

would fight for their flocks, they would fight for the best pastures for their cattle, they would fight for places to water their cattle, they would fight for the caves in which they lived or sought to live. And in these fights they would inflict and receive terrible injuries from arrows and spears of flint, from hatchets of stone and from fragments of rock which were thrown at them.

But the old-time savage man had some tenderness in his heart. He doctored his wounded kinsman, and the woman nursed the stricken warrior. For months, while injuries to head or limbs were healing, they would have to feed and nurse the wounded, and this they did, as we know from the signs which show that the injured recovered. While we shudder at the picture of battle and bloodshed in which our ancestors of the wild days passed their lives, we cannot but feel a sense of admiration for the man, savage as he then was, who nourished feelings of love and tenderness for his fellows in the hour of adversity.

THE SKILFUL SURGEONS WHO LIVED THOUSANDS OF YEARS BEFORE CHRIST

All this surgery was very rough and clumsy, and many, many centuries were to pass before men became skilful. Until quite recently it was supposed that surgery proper began with the Egyptians. But the marvellous discoveries in Crete, telling us of a wonderful civilisation there, of sea-power and of military feats which gave the Cretans a vast empire thousands of years before the birth of Christ, remind us that there must have been highly accomplished surgeons and physicians in that land long before surgery was supposed to have been known in Europe.

We must, however, go back to facts of which we are certain. Let us for a moment clearly distinguish between medicine and surgery. Surgery means the treatment and cure by operations of injuries to the body. The repair by medicine, however, has nothing to do with operations, and it was in this respect that the ancients were so ignorant. Medicine was largely superstitious practice—charms and incantations and all manner of nonsense. In surgery, however, they did wonders, considering the state of knowledge at the time. There exist papyrus documents, dating from 3,500 years before Christ, from which it is plain that at that time it was a common thing to practise quite difficult surgical operations; and surgical instruments, such as we use even to-day, have been preserved from very early times in Egypt.

MOSES, THE FIRST GREAT DOCTOR IN EGYPT, AND HIS WISE LAWS OF HEALTH

The first great doctor in Egypt was not one of the sorcerer surgeons of the Pharaohs, but Moses. He did not cut off diseased limbs, nor did he with his own hands make medicine for the sick. But Moses had a wonderful knowledge of the laws of health, and made the Israelites follow a code of regulations for their cleanliness and well-being, which preserved them in health and vigour for the forty years of their wanderings in the wilderness, and remained a heritage of health to the nation afterwards.

If the splendid laws for health which Moses drew up, fourteen centuries before Jesus was born, could be enforced in our days in the cities and in all the lands over which the Stars and Stripes fly, they would save thousands and thousands of lives every year.

There was no mystery about the methods of Moses; his laws were plain, sane rules of matter-of-fact science. But the love of mystery, of false pretences, and the growth of superstition made the cure of the body a matter of difficulty for a thousand years. We come to a period about 460 years before Christ, and discover the great Hippocrates, born in that year. His birth occurred in the island of Cos, off the coast of Asia Minor, which is famous as the birthplace also of Apelles, the great painter. For many generations the family of Hippocrates had practised medicine, and the people's attitude towards them gives us a remarkable insight into the mind of the time.

TURNING THE TEMPLES OF THE GODS INTO HOSPITALS FOR THE SICK

Hippocrates was believed to be the descendant of a god. He became a physician-priest or priest-physician, as the rest of his family before him had been. The hospitals were temples, carefully chosen to get the fullest measure of sunlight, pure air and water, and shelter from cold winds. Within the building was the temple proper;

without were porticoes, which formed what we should now call the hospital wards. And there the patients prayed to their gods, and were treated for their ailments by Hippocrates and his disciples.

THE OLD DOCTORS WHO KNEW NOTHING ABOUT THE WORKING OF THE BODY

So far no man knew anything about the action of the human heart, about the motion of the limbs, about the action of the lungs, about the process of digestion, or about the manner in which heat is maintained in the body. Naturally, then, treatment was very simple. Not understanding the working of the human body, they could not have any clear idea as to the illness from which a patient suffered. To treat a disease under these circumstances is, of course, practically impossible. Hippocrates altered this greatly. He studied hard, and introduced a new and great system.

When a person was ill, Hippocrates carefully observed the progress of his illness. Persons suffering from similar illnesses would be affected in the same way. Therefore, by getting to know what was the ordinary course of the disease, he was able to predict what would happen, to prepare for the stages which were to follow, and to be ready to grapple with every new feature of the illness. That may not sound important, but it *was* important when doctors knew nothing about illnesses, but treated the patient as if each day's sickness had no relation to the illness which had passed.

The doctors had been mere blundering machines; Hippocrates made them observant, thinking, skilled men. Of course, there was more in his system than this, but the youngest of us can see that to have done even so much was an important fact in the history of medicine.

THE GREAT WORK THAT HIPPOCRATES DID FOR ALL MANKIND

Many zealous students gathered about Hippocrates, to learn his ways and carry out his laws. He made them all take a solemn oath to respect their teacher as a father, to share their knowledge freely with their fellows, to behave with stainless honour, and never to divulge a secret learned in the sick-room.

Hippocrates died some time between 377 and 359 B.C., and his writings were a great gift to the world. Men were not wise enough to understand all that he really had done for the cure of the human body. One of his discoveries was that the course of certain diseases may be traced by listening to the sounds in a patient's chest. It took 2,000 years to make that knowledge really useful, and then Lænnec, a doctor in Brittany, invented the stethoscope, which every doctor now carries, for listening to the beating of the heart and the movements of the lungs. The work of Hippocrates was followed up at the great school of learning at Alexandria, but men broke away from the sound science which he had taught, and drifted into mysteries and folly, and not until the time of Galen was there a return to sound teaching.

Galen was born at Pergamus, in Asia Minor, in 130 A.D., and it is believed that he died in Sicily in 201. He studied at home, and afterwards at Smyrna, Corinth, and Alexandria. His close study of physiology and his clear reading of the teachings of Hippocrates made him famous as a physician. He practised in Rome, where he was far ahead of all his rivals in knowledge and in skill. They hated him for this, and managed to get him driven from the city.

HOW GALEN TAUGHT THE DOCTORS OF EUROPE FOR A THOUSAND YEARS

Galen gathered together all the safest teachings of those who had gone before him, and added to these the results of his own observations, and for a thousand years the teachings of Galen were all that Europe had to go upon in the science of curing disease.

It is wonderful to-day to see how much he knew, and yet how much he did not know. To those who had gone before, the nerves were mere mysterious tendons. Galen knew that the nerves are the telegraph wires of the brain, and that without them there is no feeling. Other men had been mystified by the muscles, but Galen found that they hold the power by which the work of the body is performed. He knew what the muscles *did*, but he could not tell *why*. "The limbs of animals have weight," he wrote, "and, like other heavy bodies, they tend to fall to the ground. Why is it, then, that they are able to move in every direction?"

Galen was the first man to judge of health by the pulse of a patient, yet he did not understand that the pulse was affected by the action of the heart.

Galen knew nothing about chemicals. All his medicines were made up of vegetable matter or animal matter. One prescription of his for a serious form of illness consisted of powdered snails, galls, and pepper! Still, it was not his actual prescriptions, but the great laws that he made, which were so important to the world.

How the Arabs Treasured up the Works of the Great Doctors

Unfortunately for mankind, Galen's laws were not generally observed. Europeans very largely forgot Hippocrates and Galen, but the Arabian surgeons and physicians treasured the works of the two great men. Their writings were translated from the original Greek into Arabic, and later again into Greek and Latin. No wonder that in the end the works became too complicated to understand or so incorrect as to be worse than useless.

Many of the physicians were grossly stupid, superstitious men, who believed in magic and spells. Among them were men who believed that they could find a single metal or medicine which would make men well for ever and give them perpetual youth and health. There were, however, some students of medicine who kept alive the art, and one surgeon, Guy de Chauliac, a Papal physician, performed many dangerous operations and wrote a great book on surgery, which is interesting to-day. He is sometimes called the "Father of Modern Surgery." It has recently been discovered that several medical schools flourished during the Middle Ages, one of them under direct patronage of the Popes. Several cities had hospitals which did much good, though, of course, they were not like our hospitals to-day. The nursing in some of them was done by the Roman Catholic sisterhoods, who have continued to do such work.

A Famous Frenchman who Combined Healing with Mercy

European surgeons and physicians were thrown on their own resources; they had to find ways and means for themselves. Superstition and magic had to be cast aside and sane methods adopted. One of the first great men of the new school was Ambroise Paré, a French surgeon, born near Laval at the beginning of the sixteenth century. He joined the French Army as a surgeon, and proved himself a man of entirely original mind. In the wars he showed himself to be as merciful as he was skilful. He sought not only to heal men of their wounds, but to heal them by the tenderest means. Up to his time, if a man had to have a limb cut off, the wound caused by the knife was often cauterised — that is to say, the wound was burnt with a red-hot iron to stop the bleeding.

Paré learned how to tie up the arteries which had been cut through, and so to stop the bleeding. He greatly improved the treatment of wounds caused by gunshots, too. In many ways he improved surgical practice, and taught Europe his methods by writing of his discoveries, so that all who wished might read. Others who should be mentioned are Dr. John Caius, Queen Mary's physician, who founded Caius College at Cambridge, and the great Vesalius, who won renown as a surgeon and a teacher, and finally became physician to the Emperor Charles V., a position his father had held before him.

William Harvey's Great Discovery of the Circulation of the Blood

In spite of the work of Paré and all the rest, there was still gross ignorance as to the working of the human body. William Harvey was born at Folkestone, England, in 1578. There was a great work for him to do. He was the son of well-to-do parents, who were able to send him to study at Padua, an Italian school of medicine which was far in advance of any of the English schools that then existed.

From there, Harvey went to Bologna and Pisa, and finally returned to Cambridge University, where he had already studied. He gained his degree as doctor, both for Padua and the English University. In Italy he heard Galileo lecture on the newly discovered laws of mechanics; and he heard Fabricius of Acquapendente, who had discovered that the veins have valves forcing the blood in a certain direction.

MEN WHO RELIEVED THE WORLD'S PAIN

Very few doctors have saved the world so much pain as Sir James Simpson, the man who discovered that chloroform could be used to make a patient unconscious during an operation. He first practised its use upon himself, and was found lying unconscious on the floor of his study, where he had fallen after inhaling chloroform.

The great French doctor Louis Pasteur, shown here in his laboratory, is best known by his discovery of a method of protecting people from hydrophobia, the terrible disease caused by a mad dog's bite. The method of treatment is something like that of vaccination for the smallpox. There is a Pasteur Institute in Paris.

The greatest doctors examined the human body, and were as much puzzled by the flow of the blood, and by the heat of the body, as we should be if we rode in a motor-car without knowing how the engine which drives the car works. There had been guesses at the truth. Some Italians say that a man, Cæsalpinus, really discovered the great fact before Harvey, but this is not certain. Harvey showed that it is when the heart contracts that it does its work, that it then pumps the blood to all parts of the body. It was a very great discovery, and was completed by the discovery of the capillaries by Malpighi, a famous Italian.

We must not be too scornful of the doctors of the past centuries. Many of them really saw some of the great truths of the present day.

Harvey made his great announcement as modestly as if it were merely the cure for a cold in the head. It all came out in lectures to a few students in London. When news of it got about, the rest of the doctors fiercely denounced him. But he lived to see his discovery believed and honoured by all, though it was many years before that happened.

JOHN HUNTER, WHO BOUGHT ANIMALS TO STUDY FOR HEALTH'S SAKE

Harvey's work carried the surgeon far forward; but there was still much to learn. Another great leader was John Hunter, who was born in Lanarkshire, in 1728. As a boy he loved play rather than study, and he never quite mastered grammar and spelling, though in after years he wrote books on surgery that were of priceless value.

His first start in life was as apprentice to his brother-in-law, a cabinet-maker. But the cabinet-maker went bankrupt, and John went to London, where his brother William, who was ten years older, was already a successful doctor. William used to teach and lecture, and John had to help him in his lectures by showing the things upon which William was speaking.

John studied hard, and entered St. George's Hospital, where, at twenty-eight, he became house-surgeon. Then he went into the Army as a surgeon for three years. Returning to England, he set up as a surgeon in London. All the money that he earned he devoted to the purchase of animals and other things which helped him to understand what is called comparative anatomy. This is the study of the structure of various animals to enable us to understand how different forms of life resemble one another. This is one of the modern ways of securing medical and surgical information now much used, and by which much that is important is learned.

HOW HUNTER CURED OTHERS, BUT COULD NOT CURE HIMSELF

John had a genius for the work. He used to lecture upon his discoveries, but more often he would hand on the result of his work to his brother William. William would say to his wondering listeners: "I am simply the demonstrator; the discovery itself was made by my brother." John was made surgeon to the king, and his fame spread through all Europe.

He was not puffed up over his success; he loved his work for its own sake, and for the good that he knew would result to humanity. Yet though he had such a profound knowledge and could cure others, he was not able to cure himself of the heart disease from which he suffered.

One day he went to a meeting. He was not feeling well, and he said to a friend: "If any dispute occurs it will be fatal to me." A dispute did occur, and poor John Hunter, upset by the excitement, staggered out of the room and fell dead of heart disease.

EDWARD JENNER, WHO STUDIED SMALLPOX AND DISCOVERED VACCINATION

One of John Hunter's pupils who became famous was Edward Jenner, the discoverer of vaccination. He was born at Berkeley Vicarage, Gloucestershire, in May, 1749, and died in his native village when seventy-three years old. After his training under Hunter he settled down in Berkeley, and there for twenty-one years he studied the subject of vaccination for smallpox. It was in 1798, when he was forty-nine, that Jenner made known his discoveries.

He believed and hoped that by spreading vaccination throughout the world smallpox would be entirely stamped out of existence. At first his theory was hotly opposed, and there is still opposition, but, after a year, more than seventy of the leading medical men of London signed an article declaring their faith in it. News of the discovery was carried throughout the civilised world, and Jenner received very many honours, while Parliament gave him $150,000.

While, as was said above, there is opposition to vaccination by people who do not think it wise to introduce sick matter into a well body, the defenders of the practice point to the fact that in former days there were epidemics of smallpox which swept away thousands and made the people go wild with terror. Now no one fears smallpox very much and deaths are less frequent.

THE BAKER'S SON WHO HELPED TO SAVE THE HUMAN RACE FROM PAIN

We see that surgery was now progressing rapidly. Up to the point that our story has reached, however, all surgical operations had had to be performed while the patients were conscious and could feel pain.

Those of us who have suffered nothing worse than having a tooth drawn without gas can imagine something of the misery which our ancestors endured in longer and more serious operations. The result was, of course, that many, many lives were lost simply because men and women were unable to bear the pain which operations would have caused.

Sir James Young Simpson was not born "Sir James," for he was the son of very poor parents. His father was a baker in Scotland, and his fortunes were at their lowest when, in June, 1811, James was born. However, his affairs took a turn for the better, and he determined that James, who proved bright and clever, should have a really good education.

THE LONG, LONG SEARCH FOR SOMETHING THAT WOULD BRING SLEEP

So the boy was sent to the best school in the district, where he studied hard all day, and helped his father in the bakery or in the shop before and after school. When he was fourteen, Simpson was sent to Edinburgh University, and at twenty-one he was made a doctor. His studies in hospitals made Simpson shudder at the miseries to which people had to submit, and he often wondered how their sufferings could be relieved. When he had become a famous doctor, Simpson heard that men had been making experiments in America with ether, and that, after inhaling it, a man had had a bad tooth drawn without feeling any pain. The man who discovered the use of ether for this purpose, on September 30, 1846, was Dr. W. T. G. Morton, a dentist of Boston. He performed experiments before doctors in a hospital. It seems certain that Dr. Crawford W. Long of Georgia had shown the properties of this drug in 1842, while Dr. Horace Wells of Hartford used nitrous oxide in 1844, but Dr. Long's discovery did not become known very widely, as he lived in a little country town, and there were few newspapers published then.

Doctor Simpson began to experiment. He did not believe that ether was the best drug. He and two friends would try all manner of things which would cause sleep. They were very brave, even reckless, but men never seem to count risks where they have a chance of finding a way to save other people's lives. For ten months Simpson worked away at his problem, but still he was not satisfied.

A LITTLE BOTTLE THAT WAS LONG FORGOTTEN, BUT MADE HUMAN HISTORY

During this time he performed operations with ether, but he was still looking for what he considered the ideal substance for producing sleep. At last, when all the things which many chemists had sent him had been tried without proving quite satisfactory, Simpson remembered a little bottle of liquid which a Scotch chemist, living in Liverpool, had forwarded to him.

It did not seem at all the sort of thing that would serve his purpose, and he had put it away and forgotten it as it lay hidden by papers. But very late one night in November, 1847, Simpson sought and found it, and immediately poured some into a glass and inhaled the perfume which arose from it.

Suppose that it should be too strong! Suppose that the sleep should have no awakening! We understand chloroform now, its wonderful properties, its merciful power of making us unconscious. But then all was mystery and doubt.

Sleep, deep and heavy, soon came. How long it lasted we do not know, but Simpson came to himself, saying: "This is far stronger and better than ether."

THE FIRST USE OF CHLOROFORM TO RELIEVE MEN OF PAIN

Now, chloroform had been discovered in 1831 by two chemists, at the same time, but independently. Nobody knew anything about its composition, until, in 1835, it was analysed and described by a great French chemist named Dumas. Simpson's Scottish friend seems to have been the first to know of it in England.

Simpson had a big practice as a doctor, and he at once began to use chloroform for his operations. It was astonishingly successful. He thought it better than ether, for it was easier to carry about and to control, easier to take.

The success of Simpson's discovery was wonderful. He operated with it at an Edinburgh hospital in the presence of a great number of doctors and students, and among the company was Dumas himself, who, twelve years earlier, had analysed and described chloroform. He was delighted at the use to which Simpson put it, and not in the least jealous of his success.

Meanwhile doctors in America continued to experiment with ether and success followed. So now there were two drugs which would destroy pain. Both are used to-day, though in the United States doctors generally prefer ether when it can be had, but chloroform is preferred in England.

Men have discovered other drugs which produce what is called local anæsthesia. This means that the nerves are prevented from conveying the sensation of pain to the brain, which itself remains clear. Some of them, if sprayed upon the skin, freeze the flesh. Others simply paralyse the nerves, as cocaine and eucaine. Others are injected between the vertebræ and prevent sensation from passing.

It was now possible for the most delicate operations to be carried out without causing the patients any pain, and cases which before had been hopeless became comparatively simple. But this brings us to another wonderful example of the way in which Nature drives us on to everlasting learning. The number of operations by surgeons increased greatly, but the number of deaths increased also. The death-rate in the hospitals became appalling. The operations themselves were quite successful; it was the after-proceedings which were so fatal. Wounds which the surgeon's knife had caused would not heal; scores of deaths followed from gangrene. Patients went in deadly fear; the doctors themselves became afraid of their work.

LOUIS PASTEUR, WHO STUDIED MICROBES THROUGH A MICROSCOPE

While this was happening, a young Frenchman was working at a problem which was unexpectedly to throw new light on the subject. His name was Louis Pasteur, and he was born at Dole, in December, 1822. His father had been one of Napoleon's soldiers, but after quitting the Army he had settled down as a tanner. Louis was very fond of his father, and hated to be away from home so much that he became quite ill through home-sickness.

"If I could only smell the tannery once more, I should feel well," he moaned. He was sent home, was able to smell his beloved tannery, and did get well. Then he returned to his studies. The microscope had been greatly improved by Joseph Jackson Lister, about whom we read on page 2320. It had become a scientific instrument instead of a toy, and with one of the new microscopes Pasteur pored over the tiniest forms of life.

"What can be the possible use of studying those ridiculous little microbes?" his puzzled teachers asked.

WHAT CAME OF PASTEUR'S STUDY OF THE "RIDICULOUS LITTLE MICROBES"

Louis was wiser than they, and kept on working. To be brief, a question of importance to humanity was this — that beer and wine and milk turn sour if exposed to the air. Why? Because

there are in the air myriads of tiny creatures which reach the fluid and corrupt it, and set up a chemical change. Now, that seems a little thing, put in this humble way; but it is one of the greatest discoveries that have ever been made. Let us see to what it led.

We remember how frightful were the deaths in the hospitals. Now, one of the greatest men studying the causes of these deaths was Joseph Lister, second son of the man whose microscope Louis Pasteur was using. Joseph Lister is still living when this story is being written, and is known as the great Lord Lister, the foremost surgeon-scientist of our time. He was born at Upton, Essex, in 1827, five years after Pasteur's birth.

When Pasteur made known his discoveries as to the tiny creatures of the air turning milk and wine sour, Lister saw that the effect must be the same in relation to injuries to the human body. He saw that serious injuries could be cured so long as the skin was not broken or cut; but that if the skin were broken or cut, then there followed that terrible corruption of the flesh—the hospital gangrene, as it was called, which was slaying so many of the patients who had been operated upon under the new power given to man by Simpson. Lister saw that if he could keep these little creatures, the microbes, from the wound, the patient would recover.

How was it to be done? Air goes almost everywhere, and in the air are myriads of microbes. He thought that the only way was to sterilise the wound, that is, to apply a strong disinfectant in which these microbes cannot live. So he began by applying strong carbolic acid to the wound. That stopped the gangrene, but the acid was so strong that the flesh could not quickly heal.

Still, there was the beginning of the principle, and thus was born what we call antiseptic surgery—the surgery which prevents poisoning of the blood by the introduction of evil germs or microbes into a wound.

Little by little Lister improved his methods. He did away with the strong carbolic acid for the wound; he used a weaker acid, then he employed a spray in the atmosphere and kept the

DR. KOCH, THE DISCOVERER OF THE CONSUMPTION GERM, AT WORK IN HIS LABORATORY

acid from the wound altogether, sterilising the air instead of the wound. At last he found that the true way was to sterilise not only the air, but everything which comes in contact with the wound, the instruments, the doctor's hands and clothes, and everything in the room.

It was a magnificent discovery, marvellous in its simplicity. It really amounts to this: We may perform the most complicated operations, and all we have to do afterwards for the healing of the wound is to maintain perfectly healthy conditions about the wound, and Nature, the wisest of all the doctors, does the rest for us. She alone can heal. To enable her to do her work we must have cleanliness, perfect cleanliness in its widest sense.

How Pasteur stamped out a pest and saved a trade for France

That was what these two great men, labouring in different countries, did for mankind. In France there was Louis Pasteur, the chemist, and in England there was Joseph Lister, the great surgeon, working together, though they had never met, to save their fellow-men by means of which the wisest men in the world had hitherto never dreamed, mastering causes the very existence of which was unknown to other men.

Of course, we have only glanced at one fragment of Pasteur's work. Nothing was too great for him to attempt. We read on page 1805 of the enormous damage done to France through the disease of her silkworms. Well, Pasteur had never seen a silkworm in his life, but he grappled with the problem and stamped out the disease, and restored to France the prosperity of her silk trade.

A doctor's gift to France worth a hundred million dollars

That alone, it has been said, was as if he had given her a solid hundred million dollars. Next he swept away chicken cholera; he showed us how a fearful disease called anthrax could be almost wholly abolished. Finally, he showed how to cure the effects of bites from mad dogs, and how to prevent dogs from going mad. His was a most wonderful life, and he used to say that the only secret of it was in his own motto: "Work, always work." He died in September, 1895, but his work lives on in the lives of the people and the health of the world. We might vastly extend our story of Lord Lister, but what he has done for surgery, while of the greatest importance, is too technical for us to understand. But we must all know that he has worked the greatest revolution of modern times in surgery. The hospital system has been entirely altered by his work, and he has given the surgeon powers which make him the most wonderful man in the world.

There is hardly anything too difficult for the modern surgeon to do. He can give us new noses and new lips. He can perform what seem like miracles with the heart; he can make mad men sane by operating on their brains; he can repair our internal organs almost as well as a musical instrument maker can repair a piano.

But there is still work to be done; there are formidable diseases still unconquered. Cancer remains one of the most terrible of our foes. Some new Lister or Pasteur will, it is to be expected, discover a cure before those of us who are now young grow old. Consumption is another frightful scourge.

Professor Koch, died in 1910, found the germ that kills millions

One of the men who have given much time and attention to this disease is Professor Robert Koch, who was born at Klausthal, Germany, in 1843. He too followed in the footsteps of Pasteur, and so discovered the germ that brings cholera and consumption, and also solved the mystery of some of the worst fevers and provided a cure for them. But with regard to consumption, it is greatly to be feared that he was in error when he told the world that consumption in cows could not be conveyed to human beings who drink the milk of consumptive cows.

His hope that he had found a remedy for consumption has not yet been justified. That is one of the world's tragedies; but it is not without some compensation, for the compound which was to protect us from consumption proves an unfailing means of enabling us to tell whether cattle are consumptive, and so puts us on our guard against animals which might, in spite of the great professor's first theory, convey the disease to us through milk.

The next Men and Women begin on 4313.

A BALLAD OF THE FLEET

THERE are few tales of heroism to compare with that of Sir Richard Grenville, one of the brave sailors of Queen Elizabeth's day. In August, 1591, when he was commanding the Revenge in Lord Thomas Howard's squadron, they fell in with a great Spanish fleet of fifty-three vessels off the Azores Islands in mid-Atlantic. The admiral made good his escape with five vessels, but Sir Richard Grenville refused to show flight before the hated Spaniards, and, though certain death was the prospect of his engaging their great fleet with his one little vessel, he sailed the Revenge into the thick of them and fought from three in the afternoon until next morning. So gallantly did he command his little ship that fifteen of the great Spanish men-of-war were beaten off, two of them were sunk, and two more disabled. Some two thousand Spanish sailors were killed or drowned before Sir Richard, fatally wounded, gave in. The poem is by Lord Tennyson.

THE REVENGE

CONTINUED FROM 4016

At Flores in the Azores Sir Richard Grenville lay,
And a pinnace, like a flutter'd bird, came flying from far away :
" Spanish ships of war at sea ! we have sighted fifty-three ! "
Then spake Lord Thomas Howard : " 'Fore God I am no coward ;
But I cannot meet them here, for my ships are out of gear,
And the half my men are sick. I must fly, but follow quick,
We are six ships of the line ; can we fight with fifty-three ? "

Then spake Sir Richard Grenville : " I know you are no coward ;
You fly them for a moment to fight with them again.
But I've ninety men and more that are lying sick ashore ;
I should count myself the coward if I left them, my Lord Howard,
To these Inquisition dogs and the devildoms of Spain."

So Lord Howard passed away with five ships of war that day,
Till he melted like a cloud in the silent summer heaven ;
But Sir Richard bore in hand all his sick men from the land
Very carefully and slow,
Men of Bideford and Devon,
And we laid them on the ballast down below ;
For we brought them all aboard,
And they blest him in their pain, that they were not left to Spain,
To the thumbscrew and the stake, for the glory of the Lord.

He had only a hundred seamen to work the ship and to fight,
And he sailed away from Flores till the Spaniard came in sight,
With his huge sea-castles heaving upon the weather bow.

" Shall we fight or shall we fly ?
Good Sir Richard, tell us now ;
For to fight is but to die !
There'll be little of us left, by the time this sun be set."
And Sir Richard said again : " We be all good Englishmen ;
Let us bang these dogs of Seville, the children of the devil,
For I never turned my back upon don or devil yet."

Sir Richard spoke and he laugh'd, and we roar'd a hurrah, and so
The little Revenge ran on, sheer into the heart of the foe,
With her hundred fighters on deck and her ninety sick below ;
For half of their fleet to the right and half to the left were seen,
And the little Revenge ran on, thro' the long sea-lane between.
Thousands of their soldiers looked down from their decks and laugh'd,
Thousands of their seamen made mock at the mad little craft
Running on and on, till delay'd
By their mountain-like San Philip, that, of fifteen hundred tons,
And up-shadowing high above us with her yawning tiers of guns,
Took the breath from our sails and we stay'd.
And while now the great San Philip hung above us like a cloud
Whence the thunderbolt will fall
Long and loud,
Four galleons drew away
From the Spanish fleet that day,
And two upon the larboard and two upon the starboard lay,
And the battle-thunder broke from them all.

And the sun went down, and the stars came out, far over the summer sea,
But never a moment ceased the fight of the one and the fifty-three.

Ship after ship, the whole night long, their high-built galleons came,
Ship after ship, the whole night long, with her battle-thunder and flame;
Ship after ship, the whole night long, drew back with her dead and her shame,
For some were sunk, and many were shatter'd, and so could fight us no more—
God of battles, was ever a battle like this in the world before?

For he said: "Fight on! fight on!"
Tho' his vessel was all but a wreck;
And it chanced that, when half of the short summer night was gone,
With a grisly wound to be dressed, he had left the deck,
But a bullet struck him that was dressing it suddenly dead,
And himself he was wounded again, in the side and the head,
And he said: "Fight on! fight on!"

And the night went down, and the sun smiled out far over the summer sea,
And the Spanish fleet, with broken sides, lay round us, all in a ring;
But they dared not touch us again, for they feared that we still could sting,
So they watched what the end would be.
And we had not fought them in vain,
But in perilous plight were we,
Seeing forty of our poor hundred were slain,
And half of the rest of us were maim'd for life
In the crash of the cannonades and the desperate strife;
And the sick men down in the hold were most of them stark and cold,
And the pikes were all broken or bent, and the powder was all of it spent;
And the masts and the rigging were lying over the side;
But Sir Richard cried in his English pride:
"We have fought such a fight for a day and a night
As may never be fought again!
We have won great glory, my men!
And a day less or more
At sea or ashore,
We die—does it matter when?
Sink the ship, Master Gunner—sink her, split her in twain!
Fall into the hands of God, not into the hands of Spain!"

And the gunner said: "Ay, ay," but the seamen made reply:
"We have children, we have wives,
And the Lord hath spared our lives.
We will make the Spaniard promise, if we yield, to let us go;
We shall live to fight again and to strike another blow."
And the lion there lay dying, and they yielded to the foe.

And the stately Spanish men to their flagship bore him then,
Where they laid him by the mast, old Sir Richard caught at last,
And they praised him to his face with their courtly foreign grace;
But he rose upon their decks, and he cried:
"I have fought for Queen and Faith, like a valiant man and true;
I have only done my duty, as a man is bound to do;
With a joyful spirit, I, Sir Richard Grenville, die!"
And he fell upon their decks, and he died.

And they stared at the dead that had been so valiant and true,
And had holden the power and glory of Spain so cheap
That he dared her with one little ship and his English few;
Was he devil or man? He was devil for aught they knew,
But they sank his body with honour down into the deep,
And they mann'd the Revenge with a swarthier alien crew,
And away she sail'd with her loss, and long'd for her own;
When a wind from the lands they had ruin'd awoke from sleep,
And the water began to heave, and the weather to moan,
And ere ever that evening ended a great gale blew,
And a wave like the wave that is raised by an earthquake grew,
Till it smote on their hulls and their sails and their masts and their flags,
And the whole sea plunged and fell on the shot-shatter'd navy of Spain,
And the little Revenge herself went down by the island crags,
To be lost evermore in the main.

FAITH

My faith looks up to Thee,
Thou Lamb of Calvary,
Saviour divine!
Now hear me while I pray,
Take all my guilt away,
O let me from this day
Be wholly Thine!

May Thy rich grace impart
Strength to my fainting heart,
My zeal inspire;
As Thou hast died for me,
O may my love for Thee
Pure, warm, and changeless be,—
A living fire!

While life's dark maze I tread,
And griefs around me spread,
Be thou my guide;
Bid darkness turn to day,
Wipe sorrow's tears away,
Nor let me ever stray
From Thee aside.

When ends life's transient dream,
When death's cold, sullen stream
Shall o'er me roll:
Blest Saviour, then, in love,
Fear and distrust remove;
O bear me safe above,
A ransomed soul!

—Ray Palmer.

THE BOY AND THE ANGEL

Robert Browning seeks to illustrate in this poem one of the greatest truths of life. The poor boy Theocrite, sincerely praising God each day, foolishly comes to think that God would be better pleased to be praised in the "great way" of the Pope of Rome, and so his ambition is to become the Pope. But God would as soon have the simple praise of the workman at his bench as that of the richest of magnates. So the poet imagines the angel Gabriel coming down to earth to take the place of the poor workman Theocrite, while Theocrite has climbed into the papal chair. Thus, in the end the angel shames the boy. The lesson is that, no matter what our condition of life may be, we are all free to praise God in our own way,

MORNING, evening, noon and night,
" Praise God ! " sang Theocrite.

Then to his poor trade he turned,
By which the daily meal was earned.

Hard he laboured, long and well ;
O'er his work the boy's curls fell.

But ever, at each period,
He stopped and sang : " Praise God ! "

Then back again his curls he threw,
And cheerful turned to work anew.

Said Blaise, the listening monk : " Well done ;
I doubt not thou art heard, my son :

" As well as if thy voice to-day
Were praising God the Pope's great way.

" This Easter Day, the Pope at Rome
Praises God from Peter's dome."

Said Theocrite : " Would God that I
Might praise him that great way, and die ! "

Night passed, day shone,
And Theocrite was gone.

With God a day endures alway,
A thousand years are but a day.

God said in heaven : " Nor day nor night
Now brings the voice of my delight."

Then Gabriel, like a rainbow's birth,
Spread his wings and sank to earth ;

Entered, in flesh, the empty cell,
Lived there, and played the craftsman well.

And morning, evening, noon and night,
Praised God in place of Theocrite.

And from a boy to youth he grew,
The man put off the stripling's hue.

The man matured and fell away
Into the season of decay ;

And ever o'er the trade he bent,
And ever lived on earth content.

(He did God's will ; to him, all one
If on the earth or in the sun.)

God said : " A praise is in mine ear ;
There is no doubt in it, no fear :

" So sing old worlds, and so
New worlds that from my footstool go.

" Clearer loves sound other ways :
I miss my little human praise."

Then forth sprang Gabriel's wings, off fell
The flesh disguise, remained the cell.

'Twas Easter Day : he flew to Rome,
And paused above Saint Peter's dome.

In the tiring-room close by
The great outer gallery,

With his holy vestments dight,
Stood the new Pope, Theocrite ;

And all his past career
Came back upon him clear,

Since when, a boy, he plied his trade,
Till on his life the sickness weighed ;

And in his cell, when death drew near,
An angel in a dream brought cheer :

And rising from the sickness drear
He grew a priest, and now stood here.

To the East with praise he turned,
And on his sight the angel burned.

" I bore thee from thy craftsman's cell
And set thee here ; I did not well.

" Vainly I left my angel's sphere,
Vain was thy dream of many a year.

" Thy voice's praise seemed weak ; it dropped—
Creation's chorus stopped !

" Go back and praise again
The early way, while I remain.

" With that weak voice of our disdain,
Take up creation's pausing strain.

" Back to the cell and poor employ :
Become the craftsman and the boy ! "

Theocrite grew old at home ;
A new Pope dwelt in Peter's dome.

One vanished as the other died :
They sought God side by side.

AN EVENING HYMN

One of the most beautiful of hymns for the evening hour is the following, written by the Rev. James Drummond Burns, a Scottish minister, who was born in 1823, and died at Mentone in 1864. Samuel, of course, was one of the great prophets of Israel, and in this hymn his qualities of mind and heart are chosen as worthy of our emulation.

HUSH'D was the evening hymn,
The temple courts were dark ;
The lamp was burning dim
Before the sacred ark,
When suddenly a voice divine
Rang through the silence of the shrine.

Oh, give me Samuel's ear—
The open ear, O Lord !
Alive and quick to hear
Each whisper of Thy word ;
Like him to answer at Thy call,
And to obey Thee first of all.

Oh, give me Samuel's heart !
A lowly heart, that waits
When in Thy house Thou art ;
Or watches at Thy gates
By day and night—a heart that still
Moves at the breathing of Thy will.

Oh, give me Samuel's mind !
A sweet, unmurm'ring faith,
Obedient and resigned
To Thee in life and death :
That I may read, with child-like eyes,
Truths that are hidden from the wise.

A NAME IN THE SAND

Hannah Flagg Gould was a very popular writer of verse in America about the middle of last century, her themes being chosen chiefly from the lowly life of her country. Her aim was always to illustrate some "moral," as she does very simply and effectively in the following little religious poem.

ALONE I walked the ocean strand;
A pearly shell was in my hand:
I stooped and wrote upon the sand
My name—the year—the day.
As onward from the spot I passed,
One lingering look behind I cast;
A wave came rolling high and fast,
And washed my lines away.

And so, methought, 'twill shortly be
With every mark on earth from me:
A wave of dark oblivion's sea
Will sweep across the place
Where I have trod the sandy shore
Of time, and been, to be no more,
Of me—my day—the name I bore,
To leave no track nor trace.

And yet, with Him who counts the sands,
And holds the waters in His hands,
I know a lasting record stands
Inscribed against my name,
Of all this mortal part has wrought,
Of all this thinking soul has sought,
And from these fleeting moments caught
For glory or for shame.

THE BARON'S LAST BANQUET

Albert Gorton Greene was a minor American poet, born in 1802, whose best-known poem is here printed. In spirited verse it retells an old legend of a warrior-baron who had so long overcome his enemies that he could scarce believe his greatest enemy of all, grim Death, had laid hands on him at last, and so drank a vain defiance with his last breath.

O'ER a low couch the setting sun had thrown
its latest ray,
Where in his last strong agony a dying
warrior lay,
The stern old Baron Rudiger, whose frame
had ne'er been bent
By wasting pain, till time and toil its iron
strength had spent.

"They come around me here, and say my days
of life are o'er,
That I shall mount my noble steed and lead
my band no more;
They come, and to my beard they dare to
tell me now that I,
Their own liege lord and master born—that
I, ha, ha! must die.

"And what is Death? I've dared him oft
before the Paynim spear—
Think ye he's entered at my gate, has come
to seek me here?
I've met him, faced him, scorned him, when
the fight was raging hot—
I'll try his might—I'll brave his power; defy,
and fear him not.

"Ho! sound the tocsin from my tower, and
fire the culverin;
Bid each retainer arm with speed, call every
vassal in;
Up with my banner on the wall; the banquet
board prepare;
Throw wide the portal of my hall, and bring
my armour there!"

A hundred hands were busy then—the
banquet forth was spread—
And rung the heavy oaken floor with many a
martial tread,
While from the rich, dark tracery along the
vaulted wall,
Lights gleamed on harness, plume, and spear,
o'er the proud old Gothic hall.

Fast hurrying through the outer gate the
mailed retainers poured,
On through the portal's frowning arch, and
thronged around the board.
While at its head, within his dark, carved
oaken chair of state,
Armed cap-à-pie, stern Rudiger, with girded
falchion, sate.

"Fill every beaker up, my men, pour forth
the cheering wine;
There's life and strength in every drop—
thanksgiving to the vine!
Are ye all there, my vassals, true?—mine
eyes are waxing dim;
Fill round, my tried and fearless ones, each
goblet to the brim.

"You're there, but yet I see ye not. Draw
forth each trusty sword,
And let me hear your faithful steel clash once
around my board.
I hear it faintly—louder yet! What clogs my
heavy breath?
Up all, and shout for Rudiger, 'Defiance
unto Death!'"

Bowl rang to bowl—steel clang to steel—and
rose a deafening cry
That made the torches flare around, and shook
the flags on high.
"Ho, cravens, do ye fear him? Slaves,
traitors, have ye flown?
Ho, cowards, have ye left me to meet him
here alone?

"But I defy him—let him come!" Down
rang the massy cup,
While from its sheath the ready blade came
flashing half-way up;
And with the black and heavy plumes scarce
trembling on his head,
There in his dark, carved oaken chair old
Rudiger sat—dead!

JESUS, TENDER SHEPHERD

This beautiful little poem is really an evening prayer in rhyme, and was written seventy years ago by Mrs. Mary Lundie Duncan, the author of "Rhymes for My Children." She is remembered as much for her quiet, useful life as for her poetry, of which she did not publish a great deal.

JESUS, tender Shepherd, hear me,
Bless Thy little lamb to-night;
Through the darkness be Thou near me,
Keep me safe till morning light.

Through this day Thine hand has led me,
And I thank Thee for Thy care;
Thou hast warmed me, clothed, and fed me,
Listen to my evening prayer.

Let my sins be all forgiven,
Bless the friends I love so well;
Take me, when I die, to heaven,
Happy, there with Thee to dwell.

A WOMAN'S SHORTCOMINGS

Most of Elizabeth Barrett Browning's poems have a depth of feeling and beauty of rhythm unsurpassed by those of any other woman poet. Although almost all her poetry was written for grown-ups, still a child can enjoy it.

She has laughed as softly as if she sighed,
  She has counted six and over,
Of a purse well filled, and a heart well tried—
  Oh, each a worthy lover!
They "give her time"; for her soul must slip
  Where the world has set the grooving;
She will lie to none with her fair red lip—
  But love seeks truer loving.

She trembles her fan in sweetness dumb,
  As her thoughts were beyond recalling,
With a glance for *one*, and a glance for some,
  From her eyelids rising and falling.
Speaks common words with a blushful air,
  Hears bold words, unreproving;
But her silence says—what she never will swear—
  And love seeks better loving.

Go, lady, lean to the night-guitar,
  And drop a smile to the bringer;
Then smile as sweetly, when he is far,
  At the voice of an indoor singer.
Bask tenderly beneath tender eyes,
  Glance lightly on their removing;
And join new vows to old perjuries—
  But dare not call it loving.

Unless you can think, when the song is done,
  No other is soft in the rhythm;
Unless you can feel, when left by one,
  That all men else go with him;
Unless you can know, when unpraised by his breath,
  That your beauty itself wants proving;
Unless you can swear, "For life, for death!"—
  Oh, fear to call it loving!

Unless you can muse in a crowd all day,
  On the absent face that fixed you;
Unless you can love, as angels may,
  With the breadth of heaven betwixt you;
Unless you can dream that his faith is fast,
  Though behoving and unbehoving;
Unless you can *die* when the dream is past—
  Oh, never call it loving!

SUDDEN LIGHT

I have been here before,
  But when or how I cannot tell:
I know the grass beyond the door,
  The sweet keen smell,
The sighing sound, the lights around the shore.

You have been mine before,—
  How long ago I may not know:
But just when at that swallow's soar
  Your neck turn'd so,
Some veil did fall,—I knew it all of yore.

Has this been thus before?
  And shall not thus time's eddying flight
Still with our lives our love restore
  In death's despite,
And day and night yield one delight once more?

—D. G. Rossetti.

THE MOUSE AND THE CAKE

Already we have read several poems by Eliza Cook, notable in her day as a writer of popular verse of a pure and elevating character. In the following from her pen, we have one of the most familiar type of fables, the "moral" of which is so plain that not even the youngest will need to have it pointed out. It is, however, a moral not readily accepted either by old or young, and for that reason there is perhaps good need to keep the little poem in circulation.

A mouse found a beautiful piece of plum-cake,
The richest and sweetest that mortal could make;
'Twas heavy with citron and fragrant with spice,
And covered with sugar all sparkling as ice.

"My stars!" cried the mouse, while his eye beamed with glee,
"Here's a treasure I've found! What a feast it will be!
But hark! there's a noise! 'Tis my brothers at play;
So I'll hide with the cake, lest they wander this way.

"Not a bit shall they have, for I know I can eat
Every morsel myself, and I'll have such a treat!"
So off went the mouse, as he held the cake fast;
While his hungry young brothers went scampering past.

He nibbled and nibbled, and panted; but still [ill;
He kept gulping it down till he made himself
Yet he swallowed it all, and, 'tis easy to guess,
He was soon so unwell that he groaned with distress.

His family heard him, and as he grew worse,
They sent for the doctor, who made him rehearse
How he'd eaten the cake to the very last crumb,
Without giving his playmates and relatives some.

"Ah me!" cried the doctor, "advice is too late;
You must die before long, so prepare for your fate.
If you had but divided the cake with your brothers,
'Twould have done you no harm, and been good for the others.

"Had you shared it, the treat would have been wholesome enough;
But eaten by *one*, it was dangerous stuff;
So prepare for the worst." And the word had scarce fled,
When the doctor turned round, and the patient was dead.

Now all little people the lesson may take,
And *some* large ones may learn from the mouse and the cake,
Not to be over-selfish with what we may gain,
Or the best of our pleasures may turn into pain.

THE ARROW AND THE SONG

In these famous verses by Henry W. Longfellow, the poet's object is to illustrate a great truth, which, if we but bear it in mind, will very seriously affect our life and conduct. Nothing that we do, nothing that we think or say, though at the time we may not guess the consequence, is done in vain. Just as the arrow shot in the air will somewhere fall to earth, so the deeds we do and the thoughts we express will make their marks perhaps on the lives of others, unseen by us, and will unconsciously affect our own lives as well.

I SHOT an arrow into the air,
It fell to earth, I knew not where;
For, so swiftly it flew, the sight
Could not follow it in its flight.

I breathed a song into the air,
It fell to earth, I knew not where;
For who has sight so keen and strong
That it can follow the flight of song?

Long, long afterward, in an oak
I found the arrow, still unbroke;
And the song, from beginning to end,'
I found again in the heart of a friend.

BIRDS IN SUMMER

The following is another of the poetical pieces by Mary Howitt, which were very widely read a generation or more ago. Although it does not rank high as poetry, there is a bright truthfulness in its effort to picture the winged freedom of the birds, and it is certainly worthy of being included in our book. It may be interesting to add that the verses are sometimes attributed to Mrs. Hemans, but we think it is much more probable that they were written by Mrs. Howitt.

HOW pleasant the life of a bird must be,
Flitting about in each leafy tree;
In the leafy trees, so broad and tall,
Like a green and beautiful palace-hall,
With its airy chambers, light and boon,
That open to sun, and stars, and moon;
That open unto the bright blue sky,
And the frolicsome winds as they wander by!

They have left their nests on the forest-bough,
Those homes of delight they need not now;
And the young and the old they wander out,
And traverse their green world round about,
And hark! at the top of this leafy hall,
How one to the other in love they call:
"Come up! Come up!" they seem to say,
"Where the topmost twigs in the breezes sway.

"Come up, come up! for the world is fair
Where the merry leaves dance in the summer air."
And the birds below give back the cry:
"We come, we come to the branches high."
How pleasant the lives of the birds must be,
Living in love in a leafy tree!
And, away through the air, what joy to go;
And to look on the green, bright earth below!

How pleasant the life of a bird must be,
Skimming about on the breezy sea,
Cresting the billows like silvery foam,
Then wheeling away to its cliff-built home!
What joy it must be to sail, upborne
By a strong, free wing, through the rosy morn;
To meet the young sun face to face,
And pierce like a shaft the boundless space;
To pass through the bowers of the silver cloud;
To sing in the thunder-halls aloud;
To spread out the wings for a wild, free flight
With the upper cloud-winds—oh, what delight!
Oh, what would I give, like a bird, to go,
Right on through the arch of the sunlit bow,
And see how the water-drops are kissed
Into green and yellow and amethyst!

How pleasant the life of a bird must be,
Wherever it listeth there to flee;
To go, when a joyful fancy calls,
Dashing adown 'mong the waterfalls;
Then to wheel about with their mates at play,
Above and below and among the spray,
Hither and thither, with screams as wild
As the laughing mirth of a rosy child!

What joy it must be, like a living breeze,
To flutter about 'mid the flowering trees;
Lightly to soar, and to see beneath
The wastes of the blossoming purple heath,
And the yellow furze, like fields of gold,
That gladdened some fairy region old!
On mountain-tops, on the billowy sea,
On the leafy stems of the forest-tree,
How pleasant the life of a bird must be!

COMMON THINGS

We have had many poems in our book which might have had this heading. The praise of common things, the romance and beauty that dwell in them, and how they may be favourably contrasted with the rich and rare things for which we so often vainly sigh, are very frequent themes with the poets of all lands. These verses, by Mrs. Hawkshawe, do not rank high as poetry, but their good sense is indisputable.

THE sun is a glorious thing,
That comes alike to all;
Lighting the peasant's lowly cot,
The noble's painted hall.

The moonlight is a gentle thing,
It through the window gleams
Upon the snowy pillow where
The happy infant dreams.

It shines upon the fisher's boat,
Out on the lovely sea;
Or where the little lambkins lie,
Beneath the old oak-tree.

The dewdrops on the summer morn,
Sparkle upon the grass;
The village children brush them off,
That through the meadow pass.

There are no gems in monarch's crowns
More beautiful than they;
And yet we scarcely notice them,
But tread them off in play.

Poor robin on the pear-tree sings,
Beside the cottage door;
The heath-flower fills the air with sweets
Upon the pathless moor.

There are as many lovely things,
As many pleasant tones,
For those who sit by cottage hearths
As those who sit on thrones!

LITTLE VERSES FOR VERY LITTLE PEOPLE

TIT-TAT-TOE,
My first go,
Three jolly butcher-boys
All in a row;
Stick one up,
Stick one down,
Stick one in the old man's crown.

THOMAS À TATTAMUS took two T's
To tie two tups to two tall trees,
To frighten the terrible Thomas à Tattamus!
Tell me how many T's there are in all that.

I HAD a little boy,
And called him Blue Bell;
Gave him a little work,
He did it very well.

I bade him go upstairs
To bring me a gold pin;
In coal-scuttle fell he,
Up to his little chin.

He went to the garden
To pick a little sage;
He tumbled on his nose,
And fell into a rage.

He went to the cellar
To draw a little beer;
And quickly did return
To say there was none there.

BIRDS of a feather flock together,
And so will pigs and swine;
Rats and mice will have their choice,
And so will I have mine.

THERE was a little man,
Who wooed a little maid;
And he said: "Little maid, will you wed, wed, wed?
I have little more to say,
So will you ay or nay?
For the least said is soonest men-ded, ded, ded."

Then the little maid replied:
"Should I be your little bride,
Pray what must we have for to eat, eat, eat?
Will the flame that you're so rich in
Light a fire in the kitchen?
Or the little God of Love turn the spit, spit, spit?"

GO to bed first,
A golden purse;
Go to bed second,
A golden pheasant;
Go to bed third,
A golden bird.

THERE was an old man,
And he had a calf,
And that's half;
He took him out of the stall,
And put him on the wall,
And that's all.

HANDY PANDY, Jack-a-Dandy,
Loves plum-cake and sugar-candy;
He bought some at a grocer's shop,
And out he came, hop, hop, hop.

NURSERY RHYMES OF THE CHILDREN OF FRANCE

EVERY country has its own nursery rhymes, for little folks must be amused with merry or quaint verses, though they are English, French, or German. And nursery rhymes are very much alike all the world over, so far as their ideas are concerned, even if their words look like none we have ever seen in print or heard before. Here are three pretty nursery rhymes in French, with English versions of the same. So many boys and girls know French that many of our readers may be able to understand the rhymes in the original language; but it is not easy to turn the French rhymes into English rhymes, and preserve the original meaning, but this has been done very cleverly in those here printed.

LA BERGÈRE

Il était une bergère
Et ron, ron, ron, petit patapon.
Il était une bergère
Qui gardait ses moutons,
Ron, ron,
Qui gardait ses moutons.

Elle fit un fromage
Et ron, ron, ron, petit patapon.
Elle fit un fromage
Du lait de ses moutons
Ron, ron,
Du lait de ses moutons.

Le chat qui la regarde
Et ron, ron, ron, petit patapon.
Le chat qui la regarde
D'un petit air fripon
Ron, ron,
D'un petit air fripon.

Si tu y mets la patte
Et ron, ron, ron, petit patapon.
Si tu y mets la patte
Tu auras du bâton,
Ron, ron,
Tu auras du bâton.

Il n'y mit pas la patte,
Et ron, ron, ron, petit patapon.
Il n'y mit pas la patte
Il y mit le menton,
Ron, ron,
Il y mit le menton !

THE SHEPHERDESS

A dainty shepherd maiden,
And cheep, cheep, cheep, little patapeep.
A dainty shepherd maiden
Was watching by her sheep,
Cheep, cheep,
Was watching by her sheep.

She made a lovely cheese once,
And cheep, cheep, cheep, little patapeep.
She made a lovely cheese once
Of milk from her kind sheep,
Cheep, cheep.
Of milk from her kind sheep.

Her cat looks up demurely,
And cheep, cheep, cheep, little patapeep.
Her cat looks up demurely,
Then quick pretends to sleep,
Cheep, cheep,
Then quick pretends to sleep.

Don't dare put in your paw, Puss,
And cheep, cheep, cheep, little patapeep,
Don't dare put in your paw, Puss,
Or you'll not be let off cheap,
Cheep, cheep,
Or you'll not be let off cheap.

Good Pussy kept her paw out,
And cheep, cheep, cheep, little patapeep.
Good Pussy kept her paw out,
But dipped her chin in deep,
Cheep, cheep,
But dipped her chin in deep.

RAMÈNE TES MOUTONS

La plus aimable à mon gré
Je vais vous la présenter
Nous lui ferons passer barrière.
" Ramène tes moutons, bergère ;
Ramène, ramène, ramène, donc,
Tes moutons à la maison."

LES PETITS BATEAUX

" Papa, les petits bateaux,
Qui vont sur l'eau,
Ont-ils des jambes ? "
" Mais oui, petit bêta,
S'ils n'en avaient pas.
Ils ne marcheraient pas !"

BRING BACK YOUR SHEEP

I'll introduce—just wait awhile—
A charming maiden by yon stile.
"Ho ! pass this way," aloud we'll mock ;
" Shepherdess, lead back your flock ;
Lead back, lead back, as you are told,
Your pretty sheep within the fold."

THE LITTLE BOAT

" Dad, has a boat,
Sailing afloat,
Got two legs like me ? "
" Yes, little zany,
If it hadn't any,
It couldn't move, you see ! "